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LECTURES
ON
COMPARATIVE ANATOMY AND ANIMAL PHYSIOLOGY,

DELIVERED BY

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LECTURE XXIII.

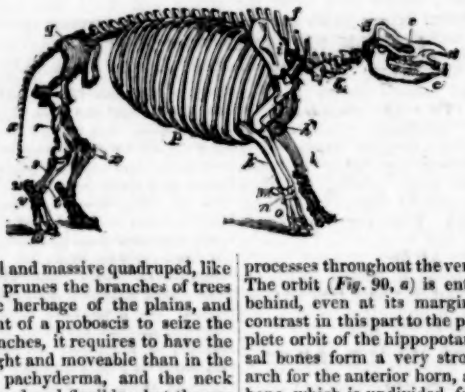
ON THE OSTEOLOGY OF PACHYDERMA.

ANIMALS succeed each other, generation after generation, like shadows on the earth, and entire species have their limited duration, which is but an instant, compared with the antiquity of the globe. Whole genera and tribes of animals, the roots of the existing races, have long since begun and finished their career, while time and life and development continue to roll on, and this great kingdom of nature, like the individuals that compose it, has had its embryo and its infant state. Of the innumerable generations that have passed away, some isolated forms have been preserved entire, embedded in solid ice, or in the frozen soil of polar regions; many have left their skeletons embalmed in the newer and softer formations, or encrusted in the solid rock; others can only be recognised by their casts, preserved in ancient strata, or by mutilated fragments of their denser parts; and others have had every trace of their existence completely effaced by time, by heat, by the revolutions of the globe. So that the study of the recent forms, those co-existent with us at this instant, is but the alphabet to the study of the extinct. It is, however, by this alone, that we can reconstruct the animals that have been, repeople a country with its ancient inhabitants, and read in its relics the history of the earth. Mammoths and mastodons have been spread over all continents as extensively as the human race, but not one now survives upon the earth; neither their longevity, nor their gigantic bulk, nor their massive strength, nor their distribution over the globe, have protected their race an instant beyond its prescribed duration. Their huge remains are found in every part of Europe, in the frozen solitudes of Russia and Siberia, and embedded entire in the icy cliffs along the shores and islands of the arctic sea; KOTZEBUE found them common on the coasts of America within the arctic circle, and PARRY in Melville island, where the temperature is now frequently fifty degrees below the freezing point; they are strewed over the Burmese empire, and the great platforms of Asia. The ponderous hippopotami have frequented the valleys of Sicily, and Italy, and France, and England, and singular forms of rhinoceroses have wandered through our peaceful forests, where they have had to encounter bears and tigers, wolves and hyenas, now so far removed from our quiet retreats. Gigantic *tapirs* have inhabited the plains of France, and the *elasmotherium* those of Siberia. The *chæropotamus* and the *adapis*, and the *anoplotherium*, and numerous species of *palæotherium*, are found chiefly in the gypsum of the Paris formation. Numerous species of *anthracotherium* and *lophiodon* occur in the tertiary beds of France and Germany. From the number of these vegetable-eating non-ruminating quadrupeds spread over the alluvial and tertiary formations of all continents, from the magnitude and entireness of their bones and skeletons, and from the remarkable and typical forms which they present, from the extraordinary geographical distribution which they exhibit when compared with that of the existing races, and from the striking indications they afford of inexplicable changes in the climate and vegetation of remote

latitudes, their study has been a favourite subject with the geologists, and is inseparably connected with all theories respecting the past revolutions of the globe.

One of the most interesting and remarkable forms of these pachyderma we have yet to examine is the rhinoceros (*Fig.* 90),

Fig. 90



This powerful and massive quadruped, like the elephant, prunes the branches of trees as well as the herbage of the plains, and from the want of a proboscis to seize the elevated branches, it requires to have the head more light and moveable than in the proboscidian pachyderma, and the neck more lengthened and flexible; but the use of its strong instrument of defence, placed on the nose, requires that neck to be powerful and muscular; hence the strength of all the processes of the cervical vertebræ. Its enormous intestine for the reception of coarse vegetable food is supported by a solid frame-work of ribs, reaching almost to the pelvic bones; hence the immobility of the whole trunk, and the almost solid shield around its exterior surface. Its muscular force is not less indicated by the lengthened form of all the processes, and the deep depressions of the bones of the arms and legs, than in those of the head and neck, the scapulæ and the pelvis. This muscular strength allows a certain degree of flexibility and elasticity to be given with safety to the feet of this heavy animal, and you observe that these members have the carpus and tarsus, and the phalanges, considerably developed, and have a lengthened form, depending chiefly on that of the metacarpal and metatarsal bones.

The skull of the rhinoceros has a lengthened tapering form, somewhat approaching to that of the tapir in the great extent and arched form of the nasal bones (*Fig.* 90, *a*), which alone support the horn in the single-horned species of India and Java. The occipital ridge rises abruptly to a great height, prolonging with it the temporal fossa, and corresponds with the great length and strength of the spinous processes throughout the vertebral column. The orbit (*Fig.* 90, *a*) is entirely deficient behind, even at its margin,—a striking contrast in this part to the prominent complete orbit of the hippopotamus. The nasal bones form a very strong and rough arch for the anterior horn, and the frontal bone, which is undivided, forms the same for the posterior horn in the two-horned species of Africa and Sumatra; and in the long skull of the fossil two-horned species so extensively spread over the older alluvia of Europe, the septum (*Fig.* 91, *a*) of the nostrils is ossified throughout, to

Fig. 91

strengthen the whole arch of the face for the heavy instruments placed upon it. The magnitude of the lips and muscular parts of the face of this animal is indicated by the great size of the infra-orbitary foramen (*Fig.* 91, *e*) for the second branch of the fifth pair or trifacial nerve. The most anomalous feature of the skull of this pachydermatous animal is the occurrence of horns, sometimes single and sometimes double, placed on the median plane, and the exterior conformation of the bones of the face and cranium which are destined to give support to those powerful instruments of defence. The large, strong, an-

chylosed, nasal bone in the single-horned rhinoceros, presents an elevated convex arched prominence, with a very rough, tuberculated, superior surface, upon which rests the strong, conical, horny, curved, and pointed instrument, which it employs in its contests with other quadrupeds. In the two-horned rhinoceros there is also a prominence of a similar form upon the anchylosed frontal bones, which are expanded and arched, and present externally a rough tuberculated and arched surface. The horns which rest upon those parts have no osseous texture in their composition. They are composed of a fibrous horny substance, which is easily observed in these decayed horns, where the fibres are seen separating from each other, and the horns splitting into their numerous component filaments, like agglutinated hairs. These continue to grow from the base, and to be pushed upwards, till they arrive at their greatest length. Constantly exposed to friction at the anterior narrow tapering part, they are continually worn in proportion as they pass from the base to the apex. The apex, therefore, which we witness in the adult animal, is not the sharp apex of the small-pointed horn which was originally formed, for a great portion of it has been worn away. It is an instrument which requires great strength in the muscles and ligaments of the head and neck of the rhinoceros; hence the muscularity and thickness of the neck of that animal; hence the magnitude of the depressions and prominences of the bones of the head and neck. In the molar teeth of this animal, which are $\frac{7}{7}$, we observe a remarkable character in the great degree of dissimilarity between those of the upper and lower jaws. The upper jaw has molar teeth, the crowns of which are of a square form, presenting very irregular wide convoluted layers of enamel passing longitudinally on the outside but transversely on the inside of the crowns of those teeth; but in the lower jaw the teeth are so narrow compared with those in the upper, that if we were not to see them in the jaws we should scarcely suppose they belonged to the same animal. They are composed in the lower jaw each of two crescentic layers, enclosing osseous substance, and have a lengthened form from before backwards, with their convexities directed outwards. The incisor teeth are two above and two below, as in the jaws of the male mastodon, and of the existing *rodentia*. By means of the flat condyle and the shallow glenoid cavity there is considerable lateral motion of the jaw for the longitudinal curves of enamel on the inferior molares.

The large nasal bones overarch the intermaxillaries, which are here very slender, and contain each a small incisor tooth. There are few quadrupeds which present spinous processes of so lengthened a form on the cervical, dorsal, lumbar, and even on the sacral vertebræ, as the rhinoceros, and the numerous coccygeal vertebræ form a long and flexible tail. Although the strong and broad ribs shield the trunk almost to the sacrum, the sternum is very short, consisting of short compressed elements which curve up on the anterior part towards the neck as in the tapir. The scapula is more lengthened than in the hippopotamus, and narrower at its vertebral margin, and has its spine lengthened and curved backwards in the middle over the large *infra-spinati* muscles. The sacrum is shorter than in the hippopotamus, but the iliac bones are more expanded, and the sacro-iliac articulation is more perpendicular from having to sustain more constant and heavier pressure on the legs than in the former semi-aquatic animal. The pelvis is short; the tuberosities of the ischia extend laterally, and the cotyloid cavities are directed obliquely downwards, the better to support the superincumbent weight. The ulna and the fibula are developed throughout their whole length, the olecranon and the patella are of great magnitude, as are the muscular processes of all the bones of the extremities. Three toes are continued to the ground before and behind, consisting each of three phalanges, the two first of which have a broad cubical form, and the last is remarkable for its rough irregular form and its extension transversely. The terminal phalanx of the middle toe on all the feet is elongated transversely on both sides, but on the other toes it is elongated only on one side, that most remote from the middle toe. So that the large hoofs have ample means of growth and support, and a broad and strong base is afforded to the heavy trunk of this powerful and ferocious animal.

In this little skeleton of the hyrax, from Abyssinia, you perceive a remarkable resemblance in the form of the molar teeth, both above and below, to those of the rhinoceros, but the ramus of its lower jaw is proportionally almost as broad and deep as that of a horse. The whole skeleton of this animal is more light and slender than that of almost any other of the pachyderma. The ribs encompass but a small part of the trunk, and leave a long lumbar region free for lateral motion. The sternum is lengthened chiefly by the development of its xiphoid elastic portion, which extends free and flexible to a considerable distance over the epigastric region. The pelvis is of great length, slender,

and attached so obliquely as to be almost in a line with the vertebral column, and hence the great length of its sacrum, to protect the upper part of this elongated pelvic region. The limbs and feet have a corresponding slender form, with four toes on the anterior, and three on the posterior extremities.

The family of proboscidian pachyderma comprehends the largest and most massive quadrupeds which at any period of the history of this planet have inhabited the surface of the dry land. Their giant bulk is supported entirely by vegetable food. This vegetable matter they derive not from the tender shoots of grass and other low vegetables that cover the nakedness of our continents, but they are provided with instruments to seize, to bruise, and to masticate to a pulp, the hard branches of the largest trees. In their kind of food and the coarseness of the vegetable matter on which they subsist, they resemble the smallest rodent animals which we observe organised with instruments, and provided with instincts which lead them, to consume the coarsest of vegetable substances. That is the case with the existing proboscidian pachyderma; and from the structure of those which we find in a fossil state, this appears to have been the character of all the animals which possessed that form.

The elephant is a gigantic mouse which has lost its inferior incisors, but these inferior incisors were present in the male of the gigantic mastodons strewed over the alluvial deposits throughout all America.

The bruising, and pounding, and reducing to minute fragments and to pulp, fitted for the alimentary canal, the thick branches of those trees that cover vast tracts along the banks of rivers and estuaries in hot climates, the continual grinding of this kind of hard food, requires instruments of great magnitude and density. The rapid abrasion of the teeth, both by the hard substances interposed between them, and by the action of those teeth upon each other when the substances between them are but small or soft, requires that there should also be the means of quick renewal in those rapidly-wearing instruments, so important to the life of these pachyderma. Those requisites of the teeth necessitate jaws of extraordinary depth, which will enable a pulp of vast magnitude to receive a commodious lodgment, and which will receive also the fangs of permanent teeth that are of great length, because of their being constantly and rapidly abraded from their exposed points; or such a kind of hard food, and such powerful actions of the jaws, would require that the teeth of these animals, continuing to be thus rapidly worn down, should be renewed repeatedly during life when they have been worn to the stumps. This is the particular mode which nature has adopted to perpetuate the molar teeth of the *proboscidia*. A singular arrangement it is in any quadrupeds, and the more singular to find it almost confined to those stupendous inhabitants of tropical forests.

The great magnitude of those dense and ponderous instruments for reducing this hard food, requires that the jaws which receive them—which support and nourish those instruments—which require deep alveoli, and pulps for their nutrition—should possess great strength, depth, and thickness; hence the depth and shortness of their inferior and superior maxillary bones, and the small number of teeth they contain at any one time through life. The incisor teeth, or the long curved tusks, by their being only two in number, and those placed in the intermaxillary bones, resemble the characters of these teeth in the rodent animals, which have only two incisors inserted in the intermaxillary bones, and the elephants resemble them in the transverse layers of their molares. There are no incisors below in the existing elephants to assist in the reduction of the food, and the incisors above being thus rendered useless with regard to the mastication of their food, the whole of that process is here thrown upon the molar teeth. The incisor teeth implanted in the intermaxillary bones in the rodent animals are of great length, and are observed to grow with great rapidity; and they are worn down with an equal rapidity; they are teeth, therefore, which never fill up, or become solid internally at their base, but are always there hollow, and allow the pulp to pass a great way upwards into those tubular teeth. When those long incisor teeth of the rodentia are deficient, either in the upper or in the lower jaw, the teeth that are opposite grow with great rapidity, and project like tusks from the mouth, having now nothing to abrade them. Such is the case with the tusks or superior incisor teeth of the elephants. The tusks of the elephant are incisor teeth apparently implanted in the intermaxillary bones, but having their bases, as in rodentia, extending into the superior maxillaries. Having nothing to abrade them, and growing rapidly, they soon project from the mouth, and the remarkable projection of the chin, or base of the lower jaw, corresponds with their slanting direction outwards and upwards. They never are completed, or cease to grow; they never fill up at their base and acquire a fang, but continue through life tubular through a considerable part of

their base. The osseous matter, or ivory, which composes the great body of the tusk, is deposited in successive layers in the interior of its cavity, so that you may view the tusk of the elephant as consisting of a series of cones, somewhat bent, and placed the one within the other, and we see them exfoliate in concentric layers when decayed. Thus it is that we find frequently, during the growth of the tusks of the elephant, that balls, which had been shot through the intermaxillary bones, and through the slender base of the tusk, have dropped into the cavity of the tusk, falling by their gravity to the lowest part that is not yet ossified in the cavity of the tusk; they there rest. The ossific matter continuing to be deposited in layers in the interior, as the tooth is gradually pushed from the jaws, it soon comes to encompass the foreign body, and in the course of time the ball is embedded completely in the solid osseous substance of these incisor teeth, as you see in the specimen before you. Now we could conceive that the ball could pass altogether through the tooth, and leave not a trace behind of its ever having existed there; for supposing, at a very early period of the formation of the second or permanent pair of tusks, the elephant had the ball shot through its intermaxillary bone, and that it gained this admission into the cavity of the tusk, and that by its gravity during the inclined position of the head, it fell down to nearly the apex of the very young hollow tooth, those incisor teeth being the chief instruments of offence and defence of the elephant,—the instruments which it is continually employing for tearing up and breaking the branches and stems of trees, and overcoming the most violent resistances opposed to it,—those tusks are continually wearing down at their tapering exposed part, so rapidly, that had the ball lodged near the apex, it would have appeared gradually externally, and the wearing of the tooth all round it, would have actually caused it to drop from the surface, and the wearing continually externally, the tooth would have assumed its natural round form, and no trace been left us that ever it had been pierced.

Deriving, thus, no assistance in mastication from their tusks, those organs of offence and defence, the whole stress of that function is thrown upon the molar teeth. Those stupendous instruments for grinding down, for more than a hundred years, the solid stems and branches of tropical trees, require to have a mechanism and a plan of growth and perpetuity very different from that of almost all other quadrupeds; nay, even of the rodentia, because the rodentia have effective incisor teeth below as well as above. By the possession of these effective incisor teeth below as well as above, the rodent animals reduce and soften and prepare their food before they carry it back to be submitted to the action of the molar teeth. The elephants can do no such thing. The food must in them come unmasticated between the molar teeth, and not reduced to a pulp already by the action of the incisors. That therefore necessitates an infinitely greater provision in the elephants for the abrasion and renewal of their molar teeth.

They consist, in the elephant, of numerous originally separate teeth, glued together by a *crusta petrosa*, or cortical part. Those teeth having their plates of enamel and of osseous substance directed transversely across the jaw,—having the same kind of longitudinal action which we see in the rodent quadrupeds, an action which consists of a motion of the lower jaw backwards and forwards, we still observe that the direction of the plates of enamel is at right angles to the direction of the motions of the jaws. It is the best possible direction for the plates of the enamel to be at right angles to the direction of the motion, for if the motion were in the same direction with the plates of enamel and of the softer osseous substance, those would play smoothly over the surface of each other, the prominences of the one sliding in the depressions of the other, and would never have the effect of grinding and reducing the solid substances that were placed between them. The food would be embedded safe from attrition in the cavities, and the corresponding cavities and prominences would slide over each other; but by having the serrated surfaces rubbing against each other, we see that no particle can escape their action. Like two millstones, all that is placed between them must be filed down to atoms. This attrition against each other then, is a cause of still more rapid abrasion of these teeth.

The molar teeth begin in the young elephant by a small number of detached transverse laminæ, forming so many entire though small and thin teeth. Those numerous thin, flat, laminæ of osseous substances, covered over each with its enamel, are anchylosed at length by the deposition of an osseous, very dense, and compact crust—a petrous crust entirely enveloping their exterior, which petrous crust glues together the few separate small laminæ of the young animal. They are yet narrow transversely, and few in number, so that they are short also longitudinally. Those are soon worn to the stumps, and they are thrown from the jaws. By this time other

larger series of similar agglutinated teeth have been formed behind, and those are rapidly advancing forwards. Before the first are thrown from the jaw, the second have advanced a considerable way. So that upon each side of each jaw in the elephant you find two molar teeth, but those two teeth in very different stages of growth,—the one behind, a newer tooth, coming forward to replace the one that is before, and which is wearing rapidly to the stump. This proceeds through the life of the elephant; and it has been observed to shed the molar teeth for eight or nine times; the incisor teeth are shed but once.

The new molar teeth that are added always consist of a greater number of plates, and are more extended transversely, so that altogether the teeth are larger as the animal advances to maturity. This requires in the elephant a considerable depth in the jaws to receive the means of nutrition of such large instruments. No parts are more variable than the incisors in their form and magnitude. They are very small in the Asiatic elephant, and generally absent in the female, but in the African species found on the western and southern parts of that continent, the tusks are both larger and more constant in the two sexes. The same sexual difference is seen in the canine teeth of many other animals, and these are nearly analogous to canine teeth, as also are the long upper incisors of rodentia, from their base and their pulp being actually situate in the superior maxillary, although they extend for security through the prolonged intermaxillary bones. The intermaxillaries form very long alveoli in the mammoths, where the tusks are of enormous magnitude and length, and in the male of the gigantic mastodon there appears to have been inferior tusks also.

The great weight of the head (*Fig.* 92),

Fig. 92

from supporting instruments so vast as the elephant's incisor (*Fig.* 92, *e f*) and molar (*Fig.* 92, *g h l m*) teeth, necessitates very powerful muscles for the support of such a heavy weight. Those muscles require necessarily that the surface of attachment on the exterior of the skull (*Fig.* 92, *b b*) shall correspond with its magnitude. But the cranial cavity (*Fig.* 92. *c*) of the elephant is but a small cavity for so large a quadruped. It is not the plan upon which the skulls of quadrupeds are constructed, to expand their cranial cavity by a development of the arachnoid coat within that cavity, as we have seen to be the case with fishes. The plan of enlarging the exterior surface of the skull in the class which we are now considering, as also in the class of birds, in owls, for instance, is by separating the two tables of the skull, or enlarging the cells (*Fig.* 92, *b b*) of the interposed diploe. That is the plan which we have already seen common in other pachyderma, as in the babyrussa. This is the plan, then, which Nature has followed to extend the exterior surface of the skull for the attachment of the powerful muscles and ligaments to move and support the heavy head. The sutures of the cranium early disappear; the inner and the outer tables are separated from each other by a large cancellated structure. This development of the diploe, or meditullium, is effected by the enlargement of the ordinary cells, or spongy texture, of which it consists in the human skull. The cells extend in a radiating direction from the centre towards the surface of the head. The parietes of those cells which thus separate the outer from the vitreous table of the skull, are placed mostly at right angles to the two tables which they connect; they are placed perpendicularly, to strengthen and support the outer table of the skull. There is a beauty in this regular arrangement of the cells of the elephant's skull. We see that by this means they take a firmer hold of this outer table, so that the muscles which are inserted over its surface, are less liable to tear away the outer from the inner table of the skull, and injuries applied externally to that hollow mass which surrounds the brain of the elephant, are less capable of breaking down the outer table, from its being thus supported by innumerable radiating thin but dense osseous plates. To lighten this cancellated structure it is filled with air, as in birds, admitted by the eustachian tubes, and occupying the place of the heavier marrow of other quadrupeds, all over the surface of its large, blown-up, sagacious-looking, but comparatively-stupid head.

The great development of the incisor

teeth of the elephant, requires enormously developed intermaxillary bones, which sheath the bases of the tusks like tubes. The openings of the nostrils (*Fig.* 92, *a*) are therefore raised high towards the crown of the head in the elephant; but those nostrils are prolonged to a considerable distance from the head, by the cartilages and muscles of that highly sensitive and flexible instrument the nose or proboscis of the animal. By the flexibility and the strength of the nose or proboscis of the elephant, it serves that animal as a most valuable substitute for the prehensile organs which it so much requires to reach its food, and so much wants. It employs this instrument to break down the branches from lofty trees, which the necessary shortness of its neck prevents it from reaching with its teeth. It employs the proboscis to draw up water from the rivers and fountains, and to fill the internal cavities of the nostrils, which are considerably dilated in the middle, and then to squirt the water thus collected into the mouth; so that it has thus a means both of reaching down to the level of its feet, without bending its great carcass to the ground, by the prolongation of the nose, and it has the means of reaching high to pull down the branches for its food, without having the neck lengthened, which could not in that form support so large and heavy a head.

This requires numerous nerves to supply so muscular and sensible an instrument—a hand attached to the face. We therefore find, that the infra-orbitary foramen is very large in the elephant and all the proboscidian pachyderma. Now you would judge from the magnitude of that foramen in the mammoths and mastodons, that they had a large second branch of the fifth or trifacial pair of nerves, to give energy and motion to a large proboscis, although we now see nothing more than the skeleton, because no part of their proboscis can be left to us in a fossil state.

The great weight of all those instruments which I have mentioned as attached to the head of the elephant (*Fig.* 93, *c d*), requires not only powerful muscles and ligaments to move and to support the head, but that the neck shall be as short as possible. It would have been impossible in the ordinary construction of animals, to have placed so vast a weight at the end of a long neck,—to have placed the head of an elephant at the end of the neck of a giraffe. The muscles, and the bones which would have been required to give attachment to such muscles, would have made the anterior part of the trunk heavier than the posterior, and would have thus required six legs in place of four. The neck, like that of the enormous beavy-headed whales and other cetaceous animals, is shortened, so that the head is brought as near as possible to be above the anterior extremities.

Fig. 93

Notwithstanding this advantage gained by the shortness of the neck of the elephant, we see the prodigious development of the spinous processes (*Fig.* 93, *e*) of the vertebræ, along the whole column to the tail, and they are still stronger in the mastodon (*Fig.* 93, *b b*). They are long and strong, and directed backwards in the elephant, and they terminate in large osseous tubercles. The ligaments are powerful which are interposed between them, and pass to the occipital bone; and the muscles are of great strength, which are attached in the expanded and concave region of the back of the head and the neck.

In the elephant, as in many other large pachyderma, the greater part of the trunk is shielded by the ribs; they pass back almost to the pelvis. The enormous weight of the abdomen, from the quantity of vegetable matter which they require to take in for nourishment, and the great development of all their digestive apparatus, require that both the muscular and the osseous parietes of the abdomen should be increased. The muscular parts of the abdomen, and all those tendinous expansions from the muscles that are continued in front, must have means of very solid attachment. Therefore it is that we find the ribs here continued backwards almost to the pelvis, although the sternum is comparatively short; and even in ruminating animals, where the ribs often terminate sooner, to allow of the necessary distention of the cavity and flexibility of the trunk, you observe that the transverse

processes of the lumbar vertebræ are enormously expanded laterally, so as to afford a broad and strong attachment for the thick parietes of the abdomen, to support the huge paunch and other abdominal viscera.

So great a carcass to be supported on the four pillars of the elephant, requires those pillars to be as perpendicular as possible, and to be chiefly composed of the strongest bones which enter into the formation of these extremities. We find thus that the large broad scapula has its glenoid cavity directed downwards, and it has its crest or spine perpendicular, and much curved, to give secure lodgement as well as extensive surface for the supra and the infra spinati and other muscles attached to its surface. The humerus is of great length and strength, expanded at both extremities like the femur; it passes down perpendicularly, and rests in a straight line very securely upon the head of the radius and the ulna. These bones cross each other and fix the hand in a state of pronation.

The strongest bones which enter into the composition of the arm, are, the humerus, the radius, and the ulna. In the slender arms of the deers and the antelopes, which were organised to skip lightly over the plains with nimble movements, we saw these long bones passing down in a zigzag direction, to give great elasticity in all their extremities. We therefore saw the heel and wrist raised high upon the legs, and long canon-bones—metatarsal and metacarpal bones. The structure, however, required here for mere support of an enormous edifice, is very different. The iliac bones are enormously expanded for the great extensor or glutei muscles.

The first great bones of the arms and legs of the elephants and mastodons pass down almost to the ground—on the anterior extremity, the humerus, the radius, and the ulna, and on the posterior extremity, the femur, the tibia, and the fibula. Those strong bones being here so important as means of support, are largely developed, strong, and massive. The feet, which have five toes on each foot, before and behind, are short and strong in all their bones. They appear in the living state only like slightly expanded bases of the four great round pillars that support the trunk. It was necessary in an animal, the weight of which was so enormous, that the anterior extremities of the feet or the points of the toes should be as near as possible to the centre of gravity of each leg. Had the toes extended much forwards from the centre of each pillar, the animal on rising upon long tiptoes would have broken the strongest tendons which ever entered into the composition of the hands or feet of any quadruped.

The elephant has—the ordinary number of toes in mammalia,—five toes on each of the feet, both in the African and in the Asiatic species. But in the African species three toes only on the hind foot are generally covered with hoofs; in the Asiatic species, four of the toes on the hind foot are covered with hoofs. These animals, inhabiting different continents, differ in several other respects from each other. The forehead is concave in the Asiatic and convex in the African species. The African elephant has the tusks considerably developed, both in the male and in the female; in the Asiatic they are smaller and generally developed in the male only. The molar teeth of the African elephant have the layers of enamel in the middle of each transverse division of these teeth, suddenly separated from each other, so as to form a lozenge-shaped cavity filled with the bony part of the tooth. In the Asiatic elephant, on the contrary, the layers of enamel pass nearly parallel to each other, though with undulating lines, across the molar teeth, having no large cavity in the middle as you see in the teeth of the African species.

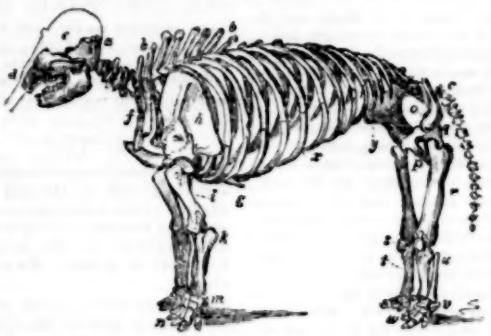
The mammoths are fossil or extinct elephants that appear to have wandered through the forests of this country, as also of most parts of Europe. At the period when those gigantic extinct elephants were inhabitants of the land we now possess, this portion of the globe had a zoological character altogether different from the present. Vast hippopotami of tropical climates frequented the banks of our rivers, and their remains are left to us in the alluvial strata of newer formation. The rhinoceros had to encounter in our forests the huge carnivorous quadrupeds,—as it now has to conflict with them on the burning sands of Africa,—lions, tigers, hyenas, wolves, and huge bears.

The mammoths, with molares of variable forms, as in their existing congeners, appear, from all the teeth which I have examined, to have come much more closely, in the forms of their molares, to the Asiatic species of elephant than to the African. In the teeth of the mammoth, we generally observe that although the layers pass transversely across the teeth parallel to each other, they are more closely applied to each other, so that in a given space of the tooth there are actually more laminæ in the mammoth than in the Asiatic elephant. The tusks of the mammoth, the incisor teeth in the upper jaw, appear, from the remains of them that are

still found in such abundance in the most northern latitudes, to have been very long, and curved in almost a circular form upwards, nine or ten feet sometimes in length, and supported by very long alveolar sheaths formed by the intermaxillary bones.

The mastodon (*Fig.* 94) is a highly-

Fig. 94



interesting and extensive genus, now entirely extinct, which was very closely allied in its general structure to the elephants. It was a proboscidian animal, which appears to have lived upon vegetable food of a softer or more succulent kind than its congenera, the mammoths and elephants. The molar teeth differ remarkably in the mammillated form of their crowns from those of the existing elephant or of the mammoths, for we find that the numerous separate plates that enter into the formation of one of the teeth of the elephant are substituted in the mastodon by a continuous crown covered with a continuous layer of enamel, and presenting a double row of large rounded tubercles, disposed generally in transverse pairs, and varying in their size and number and arrangement in the different species. Covered with a very dense layer of enamel, hard and thick, those molar teeth present in their upper surface a series of nipple-like prominences, and it is from this character that the animal received the name of *mastodon—nipple-toothed*, in Greek. There are separate round fangs distinctly formed in these large molares, and lodged in distinct alveoli; and the osseous part of the alveolus—you can perceive from the polished section of the mastodon's tooth before you—has passed up between those fangs, and taken a very secure hold of the tooth. It is chiefly from the different forms of the crowns of these molar teeth, which are the most variable of all parts in the mammoths and mastodons, according to age, sex, the position in the mouth, and the degree of abrasion, that the different species of these animals have been established, and it has lately been proposed to institute a new genus for the male mastodons, with tusks in the lower jaws—a sexual difference which we see in the superior tusks of the Asiatic elephant. In most mammalia the sexual difference is most marked in the development and forms of these parts. This new genus of proboscidia is the *tetracaulodon*. It would be curious to observe the influence of these enormous incisor tusks upon each other in the opposite jaws, if developed both above and below at the same time. The inferior tusks of the *babyrussa* appear to have bent up the alveoli of the superior tusks, and made these superior canine teeth to arch upwards over the eyes. The molar teeth of the mastodons make a nearer approach to those of the hippopotami, the tapirs, the babyrussæ, and the hog tribe, than to those of the elephant and mammoth, in their mammillated crown and their fangs. We might trace a difference in the food and habits, from the difference of form in the teeth of these proboscidian animals. By inspecting the wide layers of the molar teeth of the African elephant, you can distinctly perceive that, from the distance to which the component laminæ of these teeth are thrown from each other by the development of the middle dilated angular portions, there is proportionally a smaller quantity of enamelled surface in a given space of the tooth in the African elephant than there is in the Asiatic, and still less than in the mammoths. The parallel direction of the layers of enamel in the Asiatic species, and in the numerous extinct species, their compressed

forms bring a greater number of layers of enamel within a given space. But it was greatest in the mammoth. In the mammoth, in the space say of three inches of the crown of the tooth, there was a greater number of successive plates of enamel. The enamel is the hardest part of these teeth, most employed in grinding down the branches of the trees, and most required where the food is most resisting, and most dense and dry. We might infer from this obvious difference in the structure of these teeth, that in one of those forms where the layers of enamel are widest apart, there is an adaptation for food of a softer and more succulent kind, which required more to be bruised and pounded than to be filed and ground down; that the Asiatic animal and the mammoths fed upon substances requiring more the act of attrition than the food of the African elephant, or the extinct family of mastodons.

The whole proportions of the skeleton of these stupendous inhabitants of our ancient forests, the mastodons, are more ponderous and massive than those of the largest elephants of Africa or Asia. The thickness and strength of the jaws, the shortness and breadth of the ascending ramus of the lower jaw, the magnitude of the zygomatic arch, and of the alveoli for the superior tusks, the size and thickness of the spinous processes of the dorsal vertebræ, the massive proportions of the ribs, of the scapulæ, and of the ponderous iliac bones, the enormous size of the humerus and femur, the thickness and comparative shortness of the bones of the forearm and leg, and also of the feet, of the gigantic mastodon, mark the proportions of a stronger terrestrial quadruped than is now found on the surface of the earth. And indeed the number of huge animals—of mammalia, reptiles, and of almost every other class—which are now met with only in a fossil state, would lead us to think that while development on the surface of this planet is continually advancing in the production of more complex organic structures, the great æras of gigantic forms have passed away.

MAMMOTHS.—The skeletons of three mammoths are stated to have been found in a cavern in the island of Podresc, and lately brought to Cronstadt. One of them the Emperor Nicholas, it is said, intends to send to the *Jardin des Plantes*, at Paris.

PERSPIRATION.—Dr. Wood found a healthy hand and wrist perspire in an hour 28.33 grains of fluid. On this average the whole body yields in twenty-four hours nearly four pounds troy.

ANATOMY AND PHYSIOLOGY.

LECTURES

ILLUSTRATED BY THE

HUNTERIAN PREPARATIONS

IN THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS, LONDON.

Delivered at the College in 1833, *by*

SIR CHARLES BELL, K.G.H., F.R.S.

LECTURE V.

BONE.—*Its Sensibility—Ossification of the Skull in Health and Disease; Rickets and Hydrocephalus—Restoration of Cranial Bone—Treatment of Injuries of the Bones—Disease of the Spine—Growth of the Horns in Deer—Formation of the Skull.*

I HAVE spoken so much of the sensibility of bone without demonstrating to you the source of that sensibility, that I am happy to show you a preparation made by Mr. SWAN, which will supply the deficiency. In this specimen the nerve of the bone seems to be enlarged, and it is therefore more easy of demonstration. Having examined it, you can say that you have seen with your own eyes a nerve going into bone, and you will doubtless recollect some of the observations that I founded on this fact.

Though I have introduced this preparation to your notice, I am aware that you expect principally to see placed before you in succession, parts of the collection of Mr. HUNTER, and I am anxious to satisfy that expectation, and thus also to render justice to that great man. I feel indeed that, by doing justice to the eminent men who have preceded us, we are holding up the best example to individuals of other generations, and furnishing a high stimulus to those who, like the gentleman who has favoured us with this preparation, Mr. SWAN, are exerting themselves in the cause of science.

I now turn to a specimen from Mr. HUNTER'S collection, on which I shall induce you to reflect a little. On this occasion I must notice,—indeed no person can be more perfectly aware of the circumstance than one who attempts my present task,—the want of the means of demonstrating some points, in the museum. These preparations of Mr. HUNTER chiefly demonstrate his particular views of the animal economy, and on that circumstance depends their value; but this occasions vacancies which need to be supplied from other sources, when treating

fully on some branches, one of which is ossification of the head. Indeed, if it were not for one or two such preparations as that now before me, we should almost imagine that Mr. HUNTER had left the subject out of the series. This preparation, however, presents a most beautiful demonstration of the formation of bone in the skull, and exhibits facts of the highest possible interest. You have already learned from your teachers that bone will form in cartilage, or in membrane. You have been told that there are two modes of the formation of bone, one in which cartilage is temporarily substituted for the harder material, and the other where the process takes place in the membranes of the head, whence is shown the difference of formation in the flat and the long bones. I have myself some doubt upon the theories thus advanced, for as cartilage is absorbed previous to the formation of bone, so do we find that the membrane which surrounds the brain in the early state of the fœtus, allows a certain deposition to take place between the laminæ, before the bone is secreted into it. I have therefore some suspicion, that there is more uniformity in the nature and mode of secreting bone than is generally imagined. At all events, here is a very curious and interesting specimen bearing on this point. When the bone is first secreted in the cranium, you find it exhibit a sort of trellice work, through the meshes of which you can look. It is very transparent. Then comes another layer of these meshes, and still you can see through the interstices. Then comes a third layer, and the pores are closed. This is what is attempted to be shown in this specimen. At first the part is transparent, but when the bone is a little advanced in ossification, it becomes opaque, dense in the centre, and if you look towards the extreme parts, you recognise that there is a similarity in them to the partial ossification of the long bones. There are certain parts which ossify early and perfectly, while ossification is proceeding, as it were, towards the margin of the membrane, where it forms the sutures of the skull.

You may deduce from this, then, that the bones of the head, like the bones of the extremities, are pervious, and that arteries, vessels, lymphatics, and nerves, pass freely through the substance of all bone, and that it is the opacity of the bone which prevents you from seeing all this. The common practice of anatomists has been to remove the cause of that opacity in some bones, and exhibit the remaining porous substance, showing its perfect permeability.

Nothing is more curious than the manner in which this ossification proceeds, when under the influence of disease. Observe how the matter of bone is deposited, for instance, in hydrocephalus, where you find the membranes becoming, as it were, dropsical, and hardly more bone is deposited than will exactly serve to form the imperfect osseous covering of the earliest period of life. There is, on the other hand, a condition of the head, in which the bone is not deposited thus scantily and imperfect, but in extraordinary thickness. Again, we have a disease in which a morbid secretion exists, at first perhaps an imperfect secretion, becoming a strumous or scrofulous action, and which, occurring in bone, seems to be almost peculiar to the disease called *rickets*. The mass of bone in this disease is unnaturally white. It is important to be aware of its nature, because it gives a form to the head which resembles hydrocephalus, although it is very different from that disease; for in hydrocephalus the frontal bone is inordinately projected, and the parietal bones fall out laterally. The shape is not very different from that of the specimen I now present, in which, however, the form arises from a different cause altogether. On the os frontalis there are certain natural eminences existing. But those eminences project in the specimen before me in a remarkable manner, in consequence of the excessive deposit of bone at those parts, they being the *centres* of ossification of those bones,—where ossification in them commenced. The same kind of eminences exist in the parietal bones. Under the influence of disease, the process of ossification has been changed altogether, and limited in great measure to those centres, the water of hydrocephalus accumulating too quickly to allow of general and perfect ossification of the original membrane which formed the cranium, and thus, from the thinness of some parts, making it assume a curious form. The surgeon ought to take particular notice of this, lest he apply a trephine to a part which there is scarcely any hope of penetrating with that instrument. I have seen many men begin the operation with the utmost delicacy and tenderness for the patient, and work deep and long at it, and at last look brown with surprise, as if they thought the whole of the man's head was made of bone. No wonder they fail, for see what an enormous extent of bone they have to penetrate. At last the operator becomes excited, and a little ashamed at his want of success, and so works harder and harder until he does get through—to the great injury of the parts concerned. The probability of such

errors ought always to be considered, when we have a head of this shape under consideration.

There is another form of the head, respecting which there is much information before the profession, and to which I can add but little, viz. that of cretinism. It results from scrofula; but under the influence of a good climate, the spongy and light bone will sometimes acquire great thickness. I have brought also one more specimen, for I am desirous that you should be rewarded for coming here, by seeing as much as possible. In scrofulous disease the bones at first are spongy and thin, but at a later period an extraordinary quantity of bone is deposited in the skeleton, and the weight of the head, for instance, will become amazingly great. You here see an instance of that change.

The next series of preparations that I have beside me is one of wounds of the skull, by which we are again taught to reflect on the fact, that bones are living substances, and not only subject to disease, and injury from accidents, but possess a power of reproduction. In this specimen, a sabre has cut off an entire portion of the skull, and the bone thus freely maimed has been regenerated, and its divided parts united. Here again is a specimen in which not only has the sabre cut off a great portion of the occipital bone, but that bone lies displaced; and it is remarkable, that in all these specimens, after the bone has been cut off the parts have been obviously left to the restorative powers of nature alone, whence very important conclusions may be drawn. They show us that we should not interfere too much with the skull, nor, indeed, with the bones generally, when it is fractured, and I am certain, that if there were fewer professional aphorisms on the subject it would be better. In all these instances, I presume, the cut was very much like the one represented in the drawing to which I now point, and which I took from a Frenchman who had received two cuts with a sabre. It is remarkable, that in a great many of the skulls before us there are two cuts, as if the sabre had come round again in the same direction and made a second incision. I cannot but infer from all I have seen, and from all that is before me, that, generally speaking, we interfere too much in similar cases. In one specimen I see that the scalp has been left open, and the bone left to itself, and yet adhesion of the bone has taken place with perfect ease.

I have often noticed, that a natural sympathy and regard for the unfortunate sufferer has led our very kindness to defeat the purposes of nature. I took notes abroad of seven different cases of fracture of the skull from gun-shots, where the men were in as wretched, exhausted, cold, and miserable a state as you can imagine, and who yet were all of them alive, and intelligent, and who told me all the circumstances of their case. They were carried to a hospital, put to bed, and comfortably treated, and in twenty-four hours the cheeks were flushed, the eyes red, and the men in a state of delirium, and I have no hesitation in saying, that if these men had been left behind an old wall, without surgical aid, they would have been much more likely to survive. The facts convince me of the necessity of keeping the patient miserably low under wounds of the head, and the observation I would offer to you on them (and I am sure I shall be excused for it in a College of Surgeons) is this, that there is nothing more important in the fracture of a bone, than an attempt to make it a simple fracture, and to obtain immediate adhesion,—taking care if you do not obtain adhesion, that you have not an abscess with confined matter, a throwing off of the sequestrum, exfoliation, and the subsequent misery of loss of limb, or perhaps of life. I have seen the practice of most surgeons on the Continent, and the principle which actuates those who have witnessed most practice on the field of battle, is, in gun-shot wounds, to make free and large incisions. In illustration of this I may observe, that I took several sketches of wounded men after the battle of Waterloo (some of which you will see hanging up in the museum of the London University) where the arm had been carried off by a round shot and neglected. Now these neglected cases teach us much. Where there has been no amputation of a part, and nothing but simple dressing has been applied to the wound,—say a wound of the arm,—the living shattered humerus has stuck to the muscles, the integuments, and the tendons,—every shattered portion of it alive and granulating. The indication is obvious. If a musket-ball penetrate a bone, and the surgeon permit an abscess to form, matter surrounds every little portion of the broken dead bone, and each bit becomes a foreign body, forming a new source of irritation, and increasing the abscess. Where the wound has been left open in the former case, I have counted twenty fragments sticking to the muscles and integuments, all alive and granulating. How necessary, then, is a free incision in all these cases of fractured bones! But I am wandering from the subject of the lecture, which was meant to be a continuation of that upon which I touched at our last meeting,—the scrofulous, rickety, diminutive species of skeleton.

I shall re-approach the subject thus: A part of the body, and also the whole body, will seem nipped, blighted, and checked in its growth. The lower extremity, perhaps, affords as frequent an instance of this as any part. The lower extremity of a boy ceases to grow. I know not why. No pain is felt; no inflammation appears; there has been no injury. Yet the limb ceases to grow, and in the course of years it is small in all its proportions, and short. The boy goes to school, apparently in health, but when he returns home in the holiday time, his mother sees him limping as he walks across the drawing-room to come to her, and she fancies there is something wrong. A surgeon is sent for, who imagines there is disease in the knee or the hip. He conjectures twenty things; but the fact is, that the boy has been struck with the peculiar affection before mentioned, and the limb is not now growing. Or the same circumstance happens to the arm. The child increases in health to a certain period, but a fatal time arrives when the limb is blighted, and he advances in years with the arm of an infant attached to the body of an adult. In short, a like event will take place in various parts of the body. You see it in the eye and the testicle, as well as in the extremities.

Now our purpose here is to *agitate*, to keep alive inquiry, and the question arises whether the same disease exists where a part only of the body is limited in growth, as where the whole of the body is stunted. Whether we can reply to it or not, the query is a most important one.

In speaking of rickets we must remember that we are not treating of a disease of the spine, as the name would imply, but of a distortion of the whole body. Now is this distortion a deviation altogether from natural structure, or the result of some other defect? It is remarkable that whenever we look at a rickety skeleton, we find it to be a disease of infancy,—not the result of mollities ossium. The bones are found to be blighted, and limited in growth. Here is a distorted pelvis, and we observe in it (an important fact) that the diminution in the opening of the pelvis, both at the brim and the lower part, is partly owing to distortion and partly to something else. Is not this the pelvis of an infant? It has not the dimensions or the characters of that of an adult. Most cases of rickets are distinguished by a diminutive size of the bones. In the skeleton of the dwarf, O'Farrell, whom I mentioned in my last lecture, there is distortion. What is the inference therefrom? The head is enormous; there has been a deposition in the skull, which had converted it into a great mass of bone. We possess no opportunity of knowing whether the bone was heavy as well as large; but we know that the dwarf possessed extraordinary strength, and as a correspondence always exists between the bones and the muscles, we are sure that he could not have performed such feats of strength if the bones had not been remarkably strong. We have it on good information, that he would allow a hackney coach-wheel to pass over him, and that he could bear that only during such a violent action of the muscles as was capable of resisting immense pressure. And what is the character of the whole of this figure? It is that of a fœtus. There is a want of development in the bone, there is a shrivelling of the bone. Upon this subject I must refer you to a paper by Mr. Shaw, who has stated the facts remarkably well. In discussing the question he has thus explained himself. Here is a representation of an infant at the time of its birth, and here is another drawing by which to contrast it with the changes that take place after birth, in health, by the processes of nature. When the child is born it presents a large proportion of the upper parts of the body, and a remarkable diminution of the lower. I have already said why this happens. The child in the former drawing was observed at eight months, and at that age the upper part of the body weighed 48 drams, and the lower 12 drams. This difference formed a provision for its safe birth; but no sooner does the birth take place than a new principle of development (I know not how better to express it) comes into operation. The upper parts of the body continue to grow, but not in the same proportion as the lower, which rapidly develop themselves. At first the arms are as long as the lower extremities; afterwards they are the very reverse. Measure an adult body, and you will find that the parts above a similar line to that in the drawing of the infant, are, when compared with the parts below the line, as 38 to 39. Such is the alteration in the divisions of the body contrasted with what they present in infancy.

You will probably anticipate me in the remark, that in almost all cases of dwarfishness, if the dwarfs be not distorted or rickety, yet they have partaken of this one quality of rickets,—there has been a blighting, or, at least, a want of development of the lower part of the body. Here is a drawing in which, as well as in the case of O'Farrell, a remarkable want of growth in the lower parts of the body is apparent. It is important to notice, that in this development the scapula partakes

of the osseous deposit of the arm, and the pelvis of that of the lower extremities. The os innominatum belongs, as it were, to the lower extremities, and is either developed with them or diminished in proportion to them. You observe then the important fact, that as the lower limbs are developed the pelvis is developed, and you may estimate the size of the pelvis by the external form of the limbs.

But is this important? It is most important, for there is another disease which comes under your care twenty times more frequently than the rickets, and that is disease of the spine, which is known not to be rickets by this remarkable circumstance, that the limbs, though there is spinal disease, are large, full grown, and straight. Compare the limbs in one case with those in the other. Here is the pelvis of a rickety subject, and here is a case of distorted spine. See how different is the proportion between the two pelves. Each sufficiently indicates the condition of the lower extremities. Now suppose you are called to see a young woman with distortion of the spine. A most anxious question arises in the case. If she ever marry, is she likely to produce children with safety? Why the distortion has nothing to do with the question, because the pelvis in her case is not subject to the distortion, the scapulæ are not subject to it,—it is disease of the spine alone. It is impossible here to pass over the pregnant remark of Mr. Hunter, when alluding to this circumstance. He has laid this down as a broad and general aphorism:—"Give a part its natural use, and that use will be its stimulus to attaining perfection," which truth extends to almost every part of the body that can occupy our professional attention. You see it exemplified whenever you are under the necessity of laying up a patient in consequence of a diseased joint, and of preserving the part from all motion. The limb degenerates in every part, and the grand difficulty is to determine when you may have done with the means of diminishing the action of the part, and when, in compliance with the aphorism of Mr. Hunter, you may allow the joint to return to its natural action.

But, alas! when girls should be fulfilling the conditions of nature, by exercise and bodily occupation, they are sitting at the piano-forte, or the drawing-table, or the reading-table. They are not permitted to indulge in freedom of motion and run about as they ought. The spine, the whole texture of the muscles, all the ligaments and pulleys of the body, and the bone itself, diminish. In the language of Mr. Hunter, they want their "natural stimulus." The direction of the body is turned to one side for some unnatural purpose or other, and it cannot be turned without an effort being made on the other side in order to balance it, by which means a twist of the frame, a curvature of the spine, takes place, and at last assumes the permanent form of an italic *S*. This subject should be studied, perhaps, anatomically; you will scarcely believe, however, that there is no such thing to be got for demonstration as a spine. But you may conceive the spine to be a flexible pillar, resting on the pelvis, and supporting the weight of the upper part of the body, moveable, and inclined, with a fine and delicate elasticity, to follow every motion of the body. We have not a well-formed, well-articulated body here to show the manner in which the spine is bent forwards towards the upper part of the thorax. If there were such a preparation before us, I should almost be tempted to show you how nature protects the spine, by its position, against the injurious effects of too rapid twists, or against injury to the lower part. But you can readily understand, without illustration, that the spine is perfectly flexible, and you may see why some thin men make a more ungainly appearance than stout ones, from their inclination to stoop, in order to balance the body better; while, on the contrary, a stout and portly man, with a good deal of anterior substance, throws himself back, and has a coquetty impudent look, which might not at all belong to him, except as a consequence of poising the body. So it is too with the poor pregnant woman, bearing her burden perhaps in shame, but still walking with a proud air and an erect head. The upper part of the body must be thrown back in order to adjust the anterior growth.

Now it is strange that this should be forgotten in distortions of the spine. I have positively seen it recommended that weights should be put on the body in order to poise it in a different manner from that it has assumed, whereas weights put, for instance, on the left shoulder, must necessarily cause that side to be more elevated than it otherwise would be, for in order to adjust the new centre of gravitation thus produced, the oppressed shoulder must actually be thrown up higher even than it already was. The fact is, that in such cases the aphorism of Mr. Hunter ought to be complied with. Put a part to its natural use, and it will acquire a tendency to grow aright. This, I hope, is the natural reflection to which you will come in such matters. You will carry it out, no doubt, to much farther conclusions. Indeed it is remarkable how much genius will effect out of slight suggestions. It is

common to wonder how such a man as SHAKSPEARE contrived to effect so much from the little he had seen. Educated in one of the quietest counties in England, and seeing human life only in London, he has depicted, not only scenes of natural grandeur of the most beautiful and imposing kind, but he has laid bare the dispositions and affections of the mind, under almost every impulse that can actuate man.

The next point I shall mention, following up these preparations, is a small and curious preparation, elegantly put up, explaining the growth of bone, by the formation of the horn in deer; for as Mr. HUNTER has placed it here, it is our duty to endeavour to ascertain his object in so doing, even though it carries us away from our proper subject. In observing the brute kingdom, we cannot but observe how bountiful nature has been in her means of preserving dumb animals from a long continuation of pain, and continuing the powers of the race in their natural condition. With regard to pain, there is little or no sympathy among animals, and no rendering of assistance by one to the other. Brute animals in a natural state are not permitted to linger on in a state of disease, or to suffer long the helplessness of old age. There is an instinct existing amongst them which corrects their infirmities. The instant that one animal of a flock is tainted by disease in any way, or is hurt or injured by an accident, it is, when in a natural condition, destroyed. You know that the moment a dog is much lashed by a huntsman, he is worried by the whole pack, and if one be severely wounded he is sure to be harassed to death before morning, and eaten up. It is the same with other brute animals, which destroy the afflicted, or drive them out of the herd or flock.

Another means by which animals are preserved entire and perfect, is one which we see instanced in the principle upon which some farmers protect their stock,—the reasons which influence them in selecting their bull or their stallion. Nature has done it very curiously in the case of the deer. It causes the male to produce horns in the breeding season. Its horns are not permanent. If they were, we should suppose them meant merely for protection or defence. On the contrary, they are for *contention*. The young deer exhibits in the first year an imperfect horn, and of course cannot prevent itself from being put down by a stronger deer. The second year the horns are larger. The third year they have still more increased, and at last they so ramify, and are so strong, that perfection is arrived at. The perfection of power depends not on the horn alone, but on the head, neck, and entire frame of the animal; but the horn is the great instrument of attack. When the animal has attained this condition, it falls off again; it has less and less power, and so loses his station as father of the flock, for a younger deer arises, which obtains the mastery by means of superior size and strength of horn. Thus the procreation of the whole flock is provided for, very much in the same manner as the farmer selects and takes care of his bull or his stallion.

Look, then, to the means which nature has employed to ensure a rapid growth of the projecting bones of the head in the deer, for the horn of the deer is bone. Here is a specimen in which the first budding of the horn is seen. There is a velvet-like vascular skin around it, under the protection of which it grows, but which disappears when a good-looking horn projects. Mr. HUNTER has placed this preparation before us, to show how the bur, the prominent part, surrounds the delicate covering. At the root of the horn there is a projection above the circle, the bur, which goes round the horn; and he says that the bur, by pressing upon the roots of the vessels which have supplied the velvet-like vascular covering, stops the flow of blood to the covering, deprives it of blood and life, makes it insensible, of course, and thus allows the animal to rub it off against the branches or trunks of trees, leaving the pure bone, dense, firm, and partly suited for the gallant contests in which it is about to engage.

This is considered as a curious instance of a mechanical provision for producing a remarkable change. Mr. OWEN, however, whose mind is as active as are his limbs, remarks to me, that early in the production of the horn this bur is visible, and not only visible but prominent. If that be the case,—and I presume it to be so,—Mr. HUNTER's reasoning is good for nothing; and we are compelled to say, that nature at a particular time stimulates the parts to the growth of the horn,—just as we see that in particular seasons and at particular periods of life, different parts of the body are made to develop themselves. If so, we have here a growth of horn by the impulse of vessels which are set in action at a particular time of the year, and the function being served, there is a diminution of the enlargement or excitement of those vessels, and the inactive part exfoliates and drops off. I should have stated, that the horn grows at the exterior tables of the skull. It is also to be observed, that when the horn extends, the bones of the skull are thicker and stronger, and in proportion to the length

and strength of the horn, are the thickness and strength of the bones of the head, the sutures of which are formed in the following manner:—

When the bones of the head are first formed, they consist of simple layers of bone, as I have before mentioned. As to their manner of formation, a question has arisen whether that is accidental or not. I do not think that there is any thing in it at all accidental. When I look at a fœtal head, and observe how different is the form of its parts from that of an adult, when I see that the sutures are not yet formed, and consider how the bones are compressed together, it is my opinion, as I have already hinted, that provision is thus made for the safe and easy passage of the head through the pelvis of the mother; and many of you know full well the necessity of studying the diameter of the head, and all the portion of the head, in comparison with that of the pelvic opening, in order to understand the curious alteration that takes place in the fœtal head in parturition. I particularly notice that what is termed the "length" of the head, may be diminished an inch in delivery, and the child be saved. The transverse portion of the head may be diminished by the overlapping of the bone, and yet the child be saved. This shows a certain correspondence between the skull and the parts it contains. Were an adult head to be thus forced together, the condition of the brain would cause it to suffer, and death would be the consequence, but in a child the brain yields to the compression as if it were fluid.

I return to the progress of bone, and notice first the formation of the diploe, or central part of the bones of the skull. In the adult skull there is an external and an internal table, which latter is called *tabula vitrea*. I rather like the name, because it bears on the observations I have made. The outward table is tough, and the inner as brittle as glass, as the name implies. Between them is the diploe, a softer substance, cellular.

Is this arrangement the result of chance or intention? I say, most obviously, of *intention*. The skull is a shell, protecting the brain, which may be injured in two ways, by a sharp point, or a cutting edge, penetrating the bone, and by a blow which does not penetrate at all. In fact, the man who has a skull an inch thick, is not a bit more safe from injury of the brain, than the person who has a skull of natural thickness, for if you strike the thick skull with a sabre, though the sabre may not penetrate, the effect of the blow, like that of the back of a sword, or a hammer, or a mallet, or from a fall to the ground, passes by vibration through the skull and round the brain, and the injury done may even be greater to the functions of the brain than if the sabre had cut deeply into it. If the sabre penetrate, an awful gash, to be sure, is produced, but still the man may recover. But when a man is struck by a mallet, the vibration runs round the brain, deprives him of his mental faculties, and he falls to the ground. The skull, then, ought to protect the brain, not only as a hard shell, to prevent the edge or point of an instrument from penetrating the brain, but also to prevent percussion or concussion from reaching the brain. For this purpose can anything be better devised than the external and internal tables? What can be better calculated to stop the vibration than two tables having different constituents, the one tough and elastic, and the other brittle and dense, more especially when we consider that we have between them a substance softer than either?

Now, with regard to the sutures (the anatomist, like the naturalist, often loses himself in *minutiæ*), it was conceived that the suture was the consequence of the bones shooting out into points at its edges—the mere consequence of the necessity of one fibre of bone shooting into the interstices of the other, and chancing to form a zigzag line. I think there is clear proof that that supposition is not correct. On observing what is termed the true suture, the *sutura vera*, we find that it has teeth like a saw, each dovetailing into the opposite teeth, like a tenon and mortice. But if you look at the inside of the skull, you find nothing of the kind. It is linear, or harmonic,—a simple line of contact. The exterior is tough, like the fibres of wood; the inner is brittle, like glass. A workman in making a box with fibrous materials, dovetails the edges, but who ever thought of dovetailing that which is brittle? Can the suture then be a thing of accident? Besides, when the bones have once closed,—after having been one part of them above and another below,—one part of the frontal bone above the parietal, and so with regard to the occipital and temporal bones,—have once closed, although the skull be perfectly macerated, its bones do not separate, but each continues locked in with others.

One more observation. Here is the temporal suture formed perpendicularly. Anatomists state that this results from the pressure of the temporal muscle. How happens it that the edge of the temporal bone is always external? Who ever saw the lower part or temporal portion of the parietal bone overlap the temporal bone? Such a preparation would

Carl Ferdinand von Graef

be unique. The fact is, that the parietal bone is formed with a relation to probable injury. On the top or side there is always a disposition to spring out from its situation, and nature prevents this, by placing the temporal bone over it to keep it in its place; and not only does the *temporal* bone run deeply at the base of the skull, as though to lock all firmly together, but the sphenoid bone runs quite across the anterior part of the skull, and coming up with processes, further locks in the parietal and frontal bone, and prevents them from escaping from their proper positions.

When considering the formation of the bones of the head, although we may be drawn aside for a moment to observe their occasional morbid conditions, yet we must return to the formative process again, and watch the admirable operations by which nature attains and secures her purposes.

OCTAGON PHIALS FOR "EXTERNAL" REMEDIES.

To the Editor of THE LANCET.

SIR,—With reference to the recent very narrow escape from death of the Earl of Westmoreland, who swallowed the contents of a phial of laudanum, handed to him in mistake by his servant for a draught, an occurrence by-the-by which has frequently, and with fatal effects, taken place, I beg to suggest that medical men and chemists would relieve themselves from a heavy responsibility, by the use of an octagon phial, in which to send out laudanum, liniments, embrocations, and other articles prescribed for outward application, which phials are cast, some with the word "laudanum" on the side, others having the words "only for outward use," thus rendering it almost impossible for a mistake to be made, as the mere *feel* of such a phial in the hand of the patient or attendant, supposing the room to be dark, would denote that it cannot contain either the draught or mixture intended to be taken, and, consequently, would call for more cautious examination. The additional expense of such phials ought not for a moment to interfere with their adoption.

As I know of no channel so well calculated as THE LANCET to convey these hints to the profession, I hope you will accept them from one who has had the pleasure of being

A TEN YEARS' SUBSCRIBER.

Lancet Gallery
OF
Medical Portraits.

BARON GRAEFE.

CHARLES FERDINAND VON GRAEFE is a Pole. He was born at Warsaw in 1787. The road from the capital of Poland to Berlin is difficult, but the journey ended most successfully to the subject of this sketch, for GRAEFE now stands at the head of Prussian surgeons, not only in talent, but in rank.

His father, it appears, was secretary to the Count MOSZYNSKY, and some time after the birth of his son, removed to the town of Dolsk, near Turzisca, where young GRAEFE resided under the care of a tutor, until he had attained his fourteenth year, when he went to the gymnasium at Bautzen in Oberlausitz, and from thence to the city-school in Dresden.

He now devoted himself to the study of medicine, and frequented the lectures delivered in the Medico-Chirurgical College of Dresden. Having an early predilection for surgery, he chiefly attended the lectures and practical instructions of HEDENUS, professor of surgery, and of FORENZ, professor of midwifery. On quitting Dresden he resorted to Halle, and in that university heard STEFFENS on moral philosophy, GILBERT on physics, SPRENGEL on botany, LODER on anatomy, and BERGENER on materia medica. Pathology and therapeutics he studied under the celebrated REIL, whose clinic he also afterwards attended. In surgery his masters were LODER, FRORIEP, and BERNSTEIN. At a clinical course of accouchements he distinguished himself at this time, and REIL conferred on him the exclusive charge of the city hospital.

The University of Halle was dissolved at the French invasion by NAPOLEON, and GRAEFE, to complete his studies, went in 1807 to Leipzig, only a few leagues distant on the neighbouring border of Saxony. Here his education was perfected under ROSENMULLER, professor of anatomy, REINHOLD and ECKHOLD at the head of the clinical institution, and the famous PLATNER, professor of philosophy. After an examination he wrote his thesis, "De notione et cura angiectascos Labiorum Lipsiæ," 1807, which he defended, and thereupon obtained the diploma of "Doc-

tor," in the twentieth year of his age. The young writer extirpated, and cured, a nævus of the lip, which, having been ill-understood, had been ill-treated, and, consequently, had assumed a malignant appearance. His success seems to have induced him to present, in his dissertation, "A general view of the dilatation of vessels, and the diseases which depend thereon, as species on their genus."

The above course of studies offers a very fair example of a German education. The medical student first enters the burges'-school, then the gymnasium (classical school), and, finally, the University, where he resides three or four years, and after an extensive range of scientific and practical pursuits, graduates, as "Doctor of Medicine and Surgery,"—devoting himself afterwards to general practice, or any particular department to which his mind is determined by inclination or circumstances. The graduates who have means, often attach themselves to eminent teachers, or to the clinical institutions, where they practise many of the operations under the eye of the professor. The majority travel in their native country. Some go as far as Paris; a few reach Italy and London. This course of proceeding which, from the time and capital of the student, and from the institutions of the country, produces the greatest sum of knowledge and practical powers, has been the means of sending forth into the large towns, and into almost every district of Germany, a body of men who exercise their profession with skill, and often continue to cultivate science with ardour and success.* Forty years ago the state of science in that country presented a widely-different result; while what was called "medicine," was taught with care at the Universities, surgery was left in the lowest depths of degradation. In its regeneration, Graefe has performed a conspicuous part; we shall therefore furnish our readers with some details, which will exhibit the extent and nature of his labours, and display the progress of science, and its instruments, in the light they deserve.

In the courts and great cities of Germany there have for many years been solitary surgeons of note, but in the beginning of the present century the majority of its professors were simply instructed as ordinary mechanics—nurslings of trading companies—and they were cast upon the world ignorant, not only of anatomy and medicine, but often of the ordinary operations of the art. Some persons had to travel 80 (German) miles to be operated on for fistula lachrymalis. Hare-lips were left without cure; cataracts were couched by itinerant Frenchmen. In the hospital of a populous city, no one could operate for lithotomy.*

Frederick William the First founded the *Medico-Chirurgical College* in 1724, and *La Charité* in 1727. Frederick the Great and his successor improved the education of army surgeons in Prussia, but the following picture by *Master Woodall* remained strictly true:—"Only a certain number of surgeons are allowed in each city, town corporate, &c.,—as if the city of Hamburgh hath twelve chirurgions belonging thereto, although 1000 persons should be tending in any way to produce a freedom for a thirteenth chirurgion, it could not prevail, * * as likewise generally it is so all over Germany, and each chirurgion is bred and must be a barber, and so are all barber-chirurgions. The apprentice having made his masterpiece, and performed some manual exercise usual with them in his art, he has to give a testimony of his skill, as, namely, either by grinding and setting a delicate lancet, and therewith opening several veins smoothly; for the more manifest effecting whereof to the brethren of his calling, one will lend him his veine, namely, one on the thumb, one on the foot, and one on the arme, one other on the forehead; so also by the neat and exact making an artificial unguent or the like; which done, being by the rest of the masters of the citie approved of, and some other rites and ceremonies answering to his calling by him performed, according to the custom of the place he intendeth to reside in, he is then being esteemed a regular person, and also having made the brotherwood of the place and himself well drunk once, twice, or thrice, he is, I say, *ipso facto*, admitted to be a brother, and freely to use his function; and is styled by the name and honour of a master of his profession.†

The reformation of the surgical profession in Germany was not wrought by means of any contracts with the barbers' companies, but by teaching surgery in the universities as an organic part of medicine. Military surgeons were educated on a comprehensive system in the colleges. The good seed sown by Richter in the north,

* Before a graduate can practise, he has to undergo an examination (*staatl examen*) in the state where he proposes to settle. This examination has become gradually more severe and searching, but it varies in the different states.

* See Introduction to Graefe and Walther's Journal, b. I.

† Fragments, &c., by J. Woodall, surgeon to Bartholomew's Hospital (1639). The above was written from personal observation, as Woodall says that in his "younger dais" he lived "diverse yeres together in France, Germany, Polonia," &c.

by SIEBOLD in the south, and by MURSINNA in the Prussian states, thus found a genial soil, and ripened in such men as LANGENBECK, WALTHER, F. JAEGER and GRAEFE. The theoretic combination of medicine and surgery also exercised a favourable influence on the former. It awakened the physician from the dreams of spiritual speculation, to close observation of the matter and forms he sought to modify. REIL, one of GRAEFE's best teachers and patrons, opened his *Physiological Archives* in 1795, with an able and eloquent paper, in which he resolved the laws of organic matter into those of the universe, and strove to show that every variety of phenomena depends on differences in the forms and combinations of matter. This principle does not seem sufficient for its purpose, but, strongly enforced, the exposition of REIL directed attention to organic structure, both healthy and pathological. The other principle is still accredited by the first German physicians, who, looking with the same eye on organic as on inorganic matter, investigate its laws according to the same rules, and find in it the same philosophy. In truth, medicine is a part of natural philosophy, as man is a part of the world.

We have described the course of GRAEFE's studies, at the same time attempting to illustrate, very briefly, their spirit, and the past and present condition of surgery in Germany. The circumstances by which he was surrounded, and the works he has accomplished, being stated, the force and value of his life may be easily inferred. After graduation, GRAEFE purposed making an extensive tour; but this he renounced on being invited, at the recommendation of REIL, to the court of Anhalt Bernberg by the reigning Duke ALEXIS. He lived at Hofrath, a physician in ordinary at Ballenstadt, four years, enjoying the friendship of the Duke and the confidence of the whole country. Here he prepared the German edition of his *Dissertation*, and organised the Ballenstadt Infirmary. In the wild Selkenthal, a spring gushed from a rock at the foot of the Unterhartz mountains; GRAEFE carefully analyzed its waters, and found they were rich in iron. His book, *Der salmische Eisenquell im Selkenthal am Hartz*, was published in 1809. The Alexisbad was founded, and soon became one of the most flourishing watering places of Germany. In June, July, and August, visitors flock thither from every part of the continent to breathe the fresh air of the mountains, and bathe in the waters—to live under the clear sky of this valley.

While at Ballenstadt he was invited to become Professor ordinarius* of Surgery at Konigsberg, also Professor of Medicine and Surgery in the University of Halle; but both these invitations were declined, as he deemed it wrong to quit the Duke ALEXIS, who was then in a precarious state of health. REIL induced him in 1810 to accept a chair in the University of Berlin, established that year; and now deservedly placed in the foremost rank of the twenty-three universities of Germany. His practice was exceedingly fortunate; he speedily won the confidence of the public, and obtained a profitable connection with the court, and, it is said, managed to acquire the envy and enmity of all the resident physicians and surgeons.

Shortly after he was seated in the professional chair and had the directorship of the university surgical institute, his work on amputations was written (*Normen fur die Ablosung Grosserer Gliedmaassen*, 1812), and dedicated to FREDERIC WILLIAM III., whom he thanks for having given "his (GRAEFE's) love for science a higher aim, and his exertions a wider field." It is divided into five books; the first contains a history of amputations of the limbs; the second and third treat of the necessity and dangers of amputation; the fourth on the general principles of treatment; and the fifth describes the amputation, first, by circular incision, of the thigh, arm, arm at the shoulder-joint, and thigh at the hip-joint; secondly, by flap, of the leg, foot, and fore-arm.† This is a standard work. GRAEFE appears to have been very successful at this period, for out of thirteen amputations not one patient was lost. Most of the stumps cicatrized in twelve days, and all of them in three weeks.

In 1813 the war of "liberation" broke out, and GRAEFE volunteered his services to the Prussian army, of which he was made surgeon-general of division, having the command over the field and reserve hospitals of the army, all the military infirmaries between the Wechsel and the Rhine, and the Prussian hospitals in Holland and the Netherlands. More than 100,000 sick and wounded persons were received into these establishments, the skilful organization of which, with some hygienic and surgi-

* In the German Universities there are three classes of teachers; professores ordinarii, or regular professors; professores extraordinarii, who receive a small stipend; and privat docentes, who are permitted to teach, after a special examination.

† Each book has a motto. The following is at the head of the second:

"Ernst ist der Anblick der nothwendigkeit
Nicht ohne Schaudergreift der menschen hand
In des Geschick's geheimnisvollen urne."
SCHILLER.

cal achievement on the part of the surgeon-general, won for him the orders of "Gustavus Vasa," "St. Wladimir," and the officers' cross of the French "Legion of Honour." The "Instructions for the Medical Directors of the Hospitals," &c. published in 1813, were written by him; and while in bivouac he composed, at the request of the inhabitants of Thorgau, a pamphlet on the means of preventing the contagion of typhus. At the end of the campaign GRAEFE received new honours, and resumed his previous career in Berlin.

He introduced a new method of restoring the nose. This operation has been practised in India from time immemorial. The families BRANCA in Sicily, and BOJANO in Calabria, performed it about the middle of the fifteenth century. TAGLIACOZZI, after operating several times, divulged his method in 1597. TAGLIACOZZI took the piece, or what he termed the *popayo*, from the arm to which it was left attached. This has been called the Italian operation. In the Indian operation, the piece is taken from the forehead. Mr. CARPUE introduced this method into Europe, by two successful cases, published in 1816. GRAEFE's "Rhinoplastic, or the Art of Restoring the Nose organically," appeared in 1818,* written with the author's usual elaborate care and minuteness.

After discussing the history and general principles of the operation, the author relates three cases which were successful,—the first occurring in May, 1816, performed after the Italian method; the second after the Indian; the third in the Italian, advantageously modified, and called the "German method." A nose of fair proportions was formed in wax, and adjusted on the original site, where two longitudinal incisions were made, terminating in a point, superiorly. A piece of just dimensions was cut from the arm, and immediately grafted on the nose, with ligatures. The inferior edge of the piece, still joined to the arm, was cut as soon as adhesion had taken place. The nostrils and septum were fashioned after the model. An apparatus is fixed on the renovated organ till its form is set; the apparatus must be worn during the first winter: in summer the new nose must be exposed in the sun, to acquire colour and vigour, according to the precepts of TAGLIACOZZI. GRAEFE and his pupils have since repeatedly restored the nose and other parts of the face.†

* "Rhinoplastik oder die kunst die nase organisch zu ersetzen, &c. Mit Kupf." 1818. We have only seen the Latin translation of this work, by HECKER.

† See Journal, b. 2, p. 11.

The work entitled "Die Epidemisch-contagiöse Augenblenorrhöe Aegyptens, wahrend der Feldzuge, 1813-15, beobachtet, 1823," is GRAEFE's principal literary production. It is an excellent monograph on the Egyptian ophthalmia. The end proposed in this work is, to lay down "the results of his experience, in conjunction with the views which he has drawn from the writings of the Greeks and Arabs, and from the correspondence of several French, English, Italian, and German surgeons.

As a writer, GRAEFE displays great acuteness and power of observation. A fact is no sooner received into his mind, than all its relations are called up, and it is referred to some general principle. His powers of invention are very great, and sometimes he appears more successful in finding out explanations, than rigorous in weighing their value. In an extensive chain of facts he never forgets to enumerate the smallest link. Avigorous judgment, fraught with the fruits of rich experience, gives him an almost prophetic insight into the events which can promote and retard disease. His pathology is physiological rather than anatomical; it has been learnt on the living system; seldom by examination and careful analysis of the dead body. Impatient of difficulties, he at times makes assumptions which are unfounded, reasons on facts which have never been proved, and employs a comparatively limited knowledge of chemistry and physics, with a boldness that astonishes, rather than satisfies, an exact mind. The practical part of his works is invaluable; all of them merit attentive study; they are rich mines of instruction, in which the excellencies and the errors are too glaring to be mistaken.

GRAEFE is one of the best operators in Europe. In mechanical contrivance, presence of mind, and manual dexterity, he is unsurpassed. This last faculty, characteristic of the surgeon,* is distributed to different men in very variable proportions, and is never more required, nor more triumphantly displayed, than in the finer operations on the living frame. Yet the knife can but cut and destroy; the mechanical part forms the rudest and least of that series of phenomena which bring healing and restoration. The living organization, in which innumerable pro-

* Χειρουργια dicitur de omni arte quæ actionem habet manuum, cum cognitione conjunctam. *Scap Lex.* This is an exact definition of the Anglo-Saxon *handcraeft*. The etymology very nearly agrees—χειρ-εργον, hand craeft. Χειρουργος opifex, operarius, surgeon, then was originally *the handicraft—par excellence*.

cesses are constantly going on, is united by continuity of substance, by nerves and blood, so that the whole is concerned in each particular act, and the regulation of all its processes, of its relations to the external world, to light, heat, air, and food, with the administration of specific agents, has more influence on the cure of disease than any simply manual performance. Hence GRAEFE has evidently depended as much on the medical treatment of his cases, as on dexterous manipulation.

The following may be ranked as discoveries of GRAEFE, or as operations which, from their difficulty, are considered tests of art :—

He invented the operation for cleft palate, and after performing it in 1816, published an account of his instruments and method in Hufeland's Journal (1817). March 1, 1822, he tied the arteria innominata at its division into the carotis communis and arteria subclaviana, and thus effectually cured an aneurysm. He extirpated, in 1823, the neck of the uterus; the patient was quite well in two months. The same year he cut out the left half of the lower-jaw bone, when the cheek healed in three weeks, was scarcely disfigured, and assumed a cartilaginous hardness. In November, 1826, he extracted a cataract by upward incision; and on the arrival of March, 1827, he had had six successful cases. The eighth case was that of the Duke of CUMBERLAND, who, from circumstances not stated, only recovered the use of the right eye.* GRAEFE and his pupils have repeatedly performed similar operations.† He has saved both mother and child by the Cæsarean section. When young he saw two cases, both of which proved fatal. Reflecting on the causes of failure, he fixed on a plan by which he believed these would be obviated. The principles which should guide the surgeon before, during, and after the operation, are all laid down in the introduction. ‡

GRAEFE is a zealous and enlightened teacher. He lectures on "surgery," in its most extended sense,—on operative surgery (*akiurgy*, according to the Germans), and on ophthalmia he bestows special attention. He conducts the surgical clinic of the university, where the most interesting operations occur, and where the students of the university chiefly assemble. The plan on which this clinic is carried on is, perhaps, superior to any other now adopted. The students are divided into two classes, the "auscultantes" and the "practicantes." In the second *semestre* they become practicantes, and are exercised in the examination and diagnosis of diseases, in treating slight cases, and performing some of the minor operations. In proportion to their diligence and skill they have, during the third *semestre*, more difficult cases placed under their care, until, after a regulated series, they perform the weightier operations in surgery, under the eye of the professor, and in the midst of their fellow students. The remarkable cases are drawn up in German or Latin, read and discussed, and where there are discrepancies of opinion, these are reported. GRAEFE has himself written the reports of the institution since 1816, noting every disease, the various operations and their results, detailing the cases of most interest, and discussing any new practice or remedy which has been tried during the year. From the last report it appears, that in 1832, 368 surgical and 69 ophthalmic operations were performed. The number of auscultantes was 143, of practicantes 82; among whom were three staff-surgeons, Prince V. MAUROCORDATO, and 14 graduates. The following are some of the operations performed by the students: punctio hydrocephali, hare-lip operation, amputations of the breast, strangulated hernia, injection for hydrocele, paracentysis, amputatio penis per ligaturam, extirpatio testis, amputation of the limbs, scleroticonyxis, &c. Scarcely one of the minor operations, such as that for hare-lip, was performed by the professor.

The *Surgical and Ophthalmic Journal*, published by GRAEFE and WALTHER, is chiefly devoted to original papers. It is one of the best German journals; and has

* Graefe and Walther's Journal, b. 10, p. 363. This operation was invented by F. Jaeger, of Vienna, the first ophthalmic surgeon in Europe.

† See the reports of the Clinical Institute.

‡ The *time* of the operation, he says, should, if possible, be that of natural labour; the *place* of the incision the *linea alba*: but if the uterus do not lie in the middle of the abdomen, and cannot be brought there, the incision must be carried in a line over the fœtus. To prevent protrusion of the intestines, they must be carefully removed from the face of the uterus, and fixed with three warm sponges, each a foot long and six inches wide, so as to leave a free space eight inches long and four broad, for an incision of five French inches in length through the abdomen, and of four and a half through the uterus. In dressing the wound three sutures and circular plasters should be used. The inflammation after the operation is seldom pure, but irritative (erethismus). *Treatment.*—Laurel water M.xv, every two hours; extract of henbane, a grain three times a day; belladonna root, ten grains; water, two ounces; make an infusion for injection when the pain is severe. Where the erethismus approaches inflammation, bleed to two or three tasses. Leeches where there is fixed pain. If nervous exhaustion comes on, opium in very small doses, &c. &c.

contributed much, by sound, scientific dissertations, to elevate the character of this class of literature. At the same time GRAEFE contrives to make it the trumpet of his fame.

In 1830 GRAEFE felt his health shattered by incessant occupation, and undertook a journey to a warmer climate in the hope of recruiting his energies. Here he did not forget the interests of science. On the way he visited his favourite Alexisbad, tried the effects of the light air-breathed on the high mountains of Tyrol and Italy; and after passing under Virgil's tomb and through the dark Grotto of Posilipo, examined the Grotto del Cane on the shores of the Agnano. Leaving his wife and children in Naples, and charging his nephew Andrejewskiy to investigate the nature and effects of the gases issuing into the grotto, he sailed for Sicily. Near Mount Ætna he was shot through the shoulder by the accidental discharge of a companion's musket, and returned severely wounded to Naples, whence, without waiting till his health was perfectly restored, he hastened homewards. In the autumn of last year he was in England, on which occasion the whole-length sketch of the Baron, which accompanies this memoir, was taken by our artist in St. James's Palace, where the Baron had apartments during his residence in London, and where he had more convenient opportunities of treating the ophthalmic disorder of Prince GEORGE of Cumberland. The Baron was dressed on the occasion in the full uniform of the surgeon-in-chief of the Prussian army. The autograph of the Baron is taken from a communication addressed by him to the editor during the brief sojourn of the Baron in this metropolis.

METROPOLITAN NON-MEDICAL CORONER.

To the Editor of THE LANCET.

SIR,—Though it is almost a work of supererogation, I give you another instance of the *satisfactory* manner in which non-medical coroners conduct inquiries into cases of suspected poisoning.

A young woman, crossed in love, fell into a nervous state, and often threatened to commit suicide. She one evening asked leave from her mistress to go out to purchase some sugar. She soon returned, without having procured the article for which she ostensibly left the house. About twenty minutes after reaching home, her mistress heard a dreadful groaning in the kitchen. She descended the stairs and found the girl on the floor, writhing in agony. A medical gentleman was sent for, who having no reason to suspect that poison had been taken, thought she was labouring under a highly-wrought-up hysterical attack, and gave her some brandy-and-water, which made her sick. She was quite sensible, and begged that her old mistress, with whom she had lived four years, might be sent for, frequently expressing her hope that the old lady would "forgive her." The medical man left her, as he thought better; but before the medicine arrived, she had expired in great torment.

It came out in the evidence of the gentleman who dispensed the medicine, that he had made up the same evening for a young woman, but he thought not for this person, two drams of powdered nux vomica.

The case was adjourned for a *post-mortem* examination. On the following day the parish-surgeon, in company with other medical men, proceeded to open the body. The evidence given by the surgeon of what he saw was, that the lungs were considerably diseased from an old attack of inflammation; that a patch of inflammation appeared on one of the small intestines, and that the brain was turgid with blood, but, though minutely inspected, he could discover no apoplectic cell. From this he inferred that the patient had gone off in an attack of apoplexy.

He stated that he opened the stomach and found about a quart of fluid of darkish colour and of a gravelly consistence, that he did not examine it particularly, but that a medical gentleman in the room had done so, and had, he understood, tested the fluid.

To attempt to give you an account of the examination of the medical evidence by the non-medical coroner, would beggar all description. Suffice it to say, that that and the summing-up were of a piece with the whole of the farce. He said, in directing the jury to find a verdict of "died by the visitation of God," that "it often happened that a man in perfect health walking along the street was seized with apoplexy and died on the spot." What apposite reasoning! Did this coroner think of calling on the gentleman who had attended the post-mortem examination, who had tested the contents of the stomach, and who was present to give evidence? Did the coroner ask him one single question, although he was referred to by the medical witness? The coroner actually asked him not one question: but, after leaving the jury to flounder about

without the slightest guide or direction, he commenced summing-up, and the jury under his direction "found" that she had "died of *apoplexy!*" Here was a person dying *without one single symptom of apoplexy*, and with *every* symptom of a person labouring under the effects of an enormous dose of *strychnine*, and the jury is directed to find a verdict of apoplexy! Suppose that some one else had administered the nux vomica,—and it was not quite clear that she had not lately become enciente, inasmuch as the os uteri was completely glued up, and the canalus uteri seemed to have been freely dilated The poor girl was sensible, sick, and constantly drawing her limbs up to her bowels, and groaning loudly in agony. Yet she died of apoplexy!! Was ever any thing more monstrous! I have seen the contents of the stomach, which presents the appearance of holding a brown powder, mixed with the secretions of that organ.

I am, Sir, your obedient servant,

A. B.*

———, near London.

LIVERPOOL NON-MEDICAL CORONER AND CORONER'S DOCTOR.

To the Editor of THE LANCET.

SIR,—On Monday, the 13th of December last, an inquest was held at Liverpool on view of the body of Henry Gardiner, an apprentice on board the brig *Adelaide*, which arrived at Liverpool on the preceding Saturday night from Jamaica.

WILLIAMS, a custom-house boatman, deposed, that he found the deceased at *midnight*, a few hours after the arrival of the vessel, in the hold of the ship, lying in a state of apparent insensibility between a water-cask and a bale of cotton; that, with the assistance of another man, he carried the lad to a hut near at hand, where he died two hours afterwards.—This statement was confirmed by WHITBY, a policeman, who further proved that the person of the deceased was in a very filthy condition, also that there was a cut over one of his eyes; the hair was removed from off one side of his head, and he had two wounds on his legs.—JONES, second mate of the vessel, stated that the deceased was very ill about five months ago, and though he got somewhat better, he had never since been in good health. That about six days ago he was much worse, and had a fall from the main-yard.—AIRLEY, master of the brig, and PARRY, a seaman on board, confirmed the testimony of the previous witnesses, and also further proved that the deceased had always been well treated on board the vessel.

Mr. JOHN SCOTT and Mr. LOCKWOOD, surgeons, opened and examined the body of the deceased, and were of opinion that his death was caused by general inflammation of the brain. Verdict accordingly.

Thinking that an official explanation of the report of the above inquest, or at least of some parts of it, would be publicly offered, especially since it had become a matter of censure, and very properly so, on the part of the editors of the two local newspapers, I was unwilling sooner to make any further comment upon it. An explanation has since appeared. The *Liverpool Journal* of Saturday, the 15th of February, says, that the report is very imperfect, that the cut over the eye, the denuded scalp, and the wounds of the legs, are *satisfactorily* accounted for by the witnesses in their several depositions. Mr. Lockwood's evidence (the journalist remarks) states, that there was a bruise on the back part of the left side of the head; that on turning back the scalp there was a clot of blood corresponding with the external bruises, and that on removing the skull-cap and membrane of the brain, he found a clot of blood on the edge of the longitudinal sinus, on the left side of the brain. He adds (continues the journalist), there was general inflammation of the substance of the brain, and that it adhered, on the left side, to its membrane; and closes his testimony with an opinion that the deceased's death was caused by general inflammation.

This, Sir, is styled the *more perfect* report, and is just what might be expected from the supporters of the Liverpool coroners. In fact, this inquest may be taken as a fair sample of the daily produce of their court. The *system*, however, not so much the *men*, is to be reprobated. The business of those courts could hardly be otherwise than slovenly and inefficiently performed. The bailiffs of the mayor *must* be coroners for the borough of Liverpool. These persons are generally young men, yearly selected from the ranks of the Common Council, and in nine instances out of ten, without any other ground of fitness for the office than favouritism. This mode of manufacturing coroners may be in accordance with custom or law, but not with the dictates of common sense or prudence. Then there is the coroner's jury. Those twenty-four "cut and dried" gentry, who "wait in public-houses for a job," may also be appointed according to Act of Parliament, but they likewise may be drafted into

* This signature has been authenticated.—ED. L.

service in another way, the beadle and coroner's clerk acting as dictators; for Messrs. Bacchus, Neptune, Mars, Snip, Slop, and Co., are all freemen. They *must* be freemen in order to be jurors. This is the secret, the watch-word, the great qualification-spring that moves the machinery of this important trust.

There is another act in the farce, always played in the coroner's court of Liverpool, which ought to be immediately repressed. I allude to the manner and occasion of receiving the depositions of witnesses in the absence of the coroner. This is done by the clerk, or, more frequently, by a sort of clerk's mate, a youth of sixteen or seventeen years of age, for the purpose of saving time. The coroner is thus spared the trouble of asking questions, and going through the other tedious formalities of an inquest; so that when he comes into court he has little else to do than to glance over a deposition, speak a few words to the jury, nod once, perhaps twice, to his clerk, and sign his name, and the whole affair is completed.

That Gardiner may have died from natural causes, and that he may have had medicine administered to him, and been well treated on board the *Adelaide*, I am not in a situation to deny. There is, however, sufficient evidence in the inquest, meagre and unsatisfactory as it is, to render this at least problematical. Wounds, ulcers, and bruises, were found on his body, and his person was in a most filthy condition. Weak and emaciated as he was by disease, he was sent aloft to do duty only a few days previous to his death, and through debility and exhaustion fell from the main-yard. He was left alone on board the vessel on the night of arrival, when, as the second mate affirms, he was much worse, and too ill to eat. He was found at *midnight*, between a water-cask and a bale of cotton in the agonies of death, when he faintly articulated the word "drink," and died without uttering another syllable. In the face of all this I am told that this poor, friendless, lad was "*always* well treated," and the coroner and jury appear to have been quite satisfied on that point!

In the newspaper report of this inquest the name of the coroner was omitted! Why? Was there something in the proceedings which caused it shameful for any man to be father to them? The coroner was ascertained to be JAMES CROSBIE, Esquire.

A word more on this inquest. We are told by Surgeon Lockwood, that there was a bruise (the other injuries "are *satisfactorily* accounted for") on the back part of the head, which was so severe that its effects were at once perceptible in the interior of the skull-cap; adhesion had taken place between the membranes of the left side of the brain and the bone, and a clot of blood was found on the edge of the longitudinal sinus; the substance of the brain, too, had suffered from general inflammation. Such very extensive mischief as this ought to have been the subject of minute investigation. On this subject, however, the inquest, strange to say, threw not the least light. At any rate the report is perfectly silent on it. The fall from the main-yard might certainly have caused the injury to the brain, and so might a blow from a handspike; but admitting this,—admitting that the fall occasioned the bruise, which we have no right to admit,—was it humane, was it justifiable, to order the lad aloft to do duty under the circumstances in which he was placed at the time? If this be the kind, *good* treatment of which the officers of the ship speak, they would have some difficulty to define what is *bad* treatment. I have been at sea myself, and know something about the common usages of apprenticed sailors, and I have reason to believe that the boy Gardiner was not only not "well treated," but that he was badly treated and brutally neglected. But the lips of the unfortunate boy are sealed by death.

"Who is this Mr. Lockwood," was the inquiry some months ago of several of my brother practitioners, "that manages to be so frequently examined at the Liverpool inquests?" Mr. Lockwood is the same surgeon who figures in the inquest on poor Gardiner; the same surgeon whose name has occupied a place in every newspaper report of inquest which has been tried at Liverpool during the last eighteen months, and whose presence at those inquests has interfered with the interests of many medical men who ought to have been there in his stead. Mr. Lockwood was in favour with Mr. A., late a coroner, who, soon after his appointment to the coronership, waited upon the bridewell-keepers, turnkeys, and other officers of station-houses, police-offices, prisons, and other places in which he imagined he had any influence, and left his compliments, with a card, bearing on it the name and profession of this Mr. Lockwood, with a request that Mr. L. might be sent for in every case of accident, and especially when an inquest was necessary. Now and then Mr. A. carried his services so far that he even acted as *internuncio* himself! THE LANCET was the chief instrument, I believe, of getting this Mr. A. out of the office he unworthily filled. As for Mr. Lockwood, it would ap-

pear that he is fully invested with all the rights, privileges, and immunities, of "coroner's doctor" of the borough of Liverpool.

I am, Sir, yours sincerely,
THOMAS WEATHERILL, M.D.
Liverpool, March, 1834.

FOSSIL IN THE BRISTOL MUSEUM.—PROFESSOR GRANT'S REMARKS.

To the Editor of THE LANCET.

SIR,—In your number for January 11, 1834, page 576, you have reported the following observations of Professor Grant, on a fossil which is deposited in the Bristol Institution:—"A skeleton was lately found, and is preserved in the museum of Bristol, which has the upper and lower jaws slender, and prolonged like those of the gavials, the crocodiles of the Ganges. It has been supposed, from examining its osteology, that this remarkable fossil belonged to a cartilaginous fish, but from the circumstance I have mentioned to you, it appears to me more probable, that no cartilaginous fish ever possessed a lower jaw of that length and slenderness; that that skeleton could not have belonged to a cartilaginous fish, which has the skeleton too soft to be be preserved entire in the strata of the earth, but must have belonged to an animal which had the lower jaw composed, like the gavials and pterodactyli, of more solid bones." In reply to these objections of the learned professor, may I beg the favour of your inserting the following remarks:—

1st. The statement "that nothing but the teeth of cartilaginous animals has been found in a fossil state," is contradicted by the fact of numerous specimens of the most delicate parts, even the extremities or fins of rays, for example, being preserved in many collections from the identical strata (Lyas of Lyme Regis) from which the animal alluded to was obtained. 2nd. The specimen alluded to cannot be a saurian, and, consequently, not a gavial, because in its jaws there are no teeth, or traces of them, neither are there alveoli, characters belonging to all saurians. 3rd. The lower jaw has no foramen posteriorly on either side, so invariable in all crocodiles, and, consequently, in the gavial. 4th. The lower jaw is not divided into two branches, as in all the saurians. 5th. With regard to the upper jaw and cranium, there are no traces of a cranio-respiratory canal, a character indispensable to all reptiles with an aerial respiration. 6th. The anterior extremity of the upper jaw of our Bristol specimen terminates conically, but in the gavials the portion formed by the intermaxillaries increases considerably in its transverse diameter, and contains the wide opening of the respiratory canal, of which opening no marks are observable in our fossil. 7th. In the gavials the temporal holes, or fossæ, on the upper surface of the cranium, are of very large size, - larger than in the crocodiles and alligators, but no traces of such holes are to be met with in our specimen. 8th. No T-shaped bones are articulated with the cervical vertebræ, neither are there marks for their attachment. The number of the vertebræ is much greater in our fossil. 9th. In the saurians the ribs are numerous, of considerable size, and articulated with the dorsal vertebræ; but in the specimen in question there are no traces either of them, or of the cavities for their articulation; in fact, the antero-posterior diameter of these vertebræ is too small to admit of an articulation with ribs having the saurian type. 10th. The number of these vertebræ is much too great for the saurian type, and their diameters are the very opposite of those of the gavials. In the caudal region there are no remains of cherron bones, an indispensable part of the tail of aquatic saurians; and as there are no extremities divisible, like those of the gavials, into arm, forearm, &c., I shall not attempt to make a comparison, but a very short inspection of the bones of the shoulder and pelvis will suffice to show that our animal does not in this respect resemble a gavial. 11th, and lastly, a great number of spines with radiated bases are distributed over the surface of the fossil. They are identical with those observed on the thorn-back, the toad-fish, &c., and, consequently, furnish a character totally at variance with the supposition of its being a saurian.

I trust the following remarks will not be thought irrelevant, and if we are not justified in calling it a cartilaginous fish, having many points of resemblance to the sharks and rays, it must be evident that it is not a saurian, and, consequently, not a gavial. For our parts we conceive it to be a new genus, presenting many interesting and curious characters, and, as such worthy the attention of those who are making the extinct fauna their study. We also beg to express a hope, that as the loan of it has been offered to the *Geological Society*, it will give our talented and industrious friend, Professor Grant, a better opportunity of studying it than has

heretofore been furnished by a drawing. I remain, Sir, your most obedient servant,

A GEOLOGIST.

Bristol, March 11, 1834.

*** Dr. Grant never having seen this interesting fossil, did not venture to ascribe it to any known genus of *sauria*, where the teeth are as often without alveoli as with them, but remarked that the *lower* jaw, being long and slender, like that of gavials and pterodactyli, could not have been composed of a soft and yielding cartilaginous substance, like the short enamelled jaws of rays and sharks, and that the fossil must, therefore, have belonged to some other tribe of animals than the cartilaginous fishes, where there is nothing similar.

THE LANCET.

London, Saturday, March 22, 1834.

THE sittings of the Parliamentary Committee were resumed on Tuesday last,* and during that day, Wednesday, and Thursday, three witnesses were examined, Sir H. HALFORD, Dr. MACMICHAEL, and Dr. SEYMOUR. We are precluded by the rules of the House from stating the facts which have already been elicited, and in accordance with the strict spirit of those rules, we shall make no remark on the tendency of the evidence, or refer to the impression which it must have produced on the minds of the spectators. It is understood that the sittings will be regularly continued at twelve o'clock every day during the ensuing week. The committee-room is now thrown open to strangers, so that admission is free from the tax of formal ceremony.

* In a *part* of our impression of last week, it was noticed, by mistake, that the members of the Committee would assemble on *Monday*. The word *Tuesday* should have been used.

AN operation which has created an extraordinary sensation in the medical circles at the west end of the town, has lately been performed at St. George's Hospital. The operator was Mr. CÆSAR HAWKINS.

Now is it too much to call on Mr. HAWKINS, who holds a public situation in a public institution, to make known to the public the circumstances which led to the performance of this operation, with an explanation of the causes of the death of the patient? Assuredly not.

We do, therefore, make the demand, on the behalf of the profession and the public, and thus we afford Mr. HAWKINS an opportunity of publishing his own version of the catastrophe; and we trust that the appearance of his own report will render the publication of one by us altogether unnecessary.

A QUESTION of great public importance will be brought before the Parliamentary Committee,—will naturally arise out of the exclusion of country practitioners from the hospitals which exist in the distant cities and towns of the empire. The pretext for upholding the system of exclusiveness in the metropolitan hospitals is irrationally founded on the supposition, that if the hospitals of London were thrown open to medical practitioners in general, the attendance of visitors would be too numerous to admit of the efficient discharge of the duties required by the sufferings and necessities of the patients. That this is only a *pretext*, a scandalous and illiberal manœuvre of the medical officers themselves, to be ridded of the observation of persons competent to decide on the merits of their professional practice, is sufficiently obvious to all persons who are acquainted with the daily occu-

pations of medical practitioners, and of the great capaciousness of our endowed medical charities.

But, passing from the metropolis to the hospitals of the country towns, no such plea can *there* be urged for excluding the physicians, surgeons, and apothecaries, residing in the neighbourhood, from an opportunity of sharing in the interest of, and deriving information from, the treatment of those patients who are systematically admitted into the wards of the country hospitals of this kingdom. We can imagine that in some small towns, where sectarianism has been permitted to disturb the tranquillity of every family,—that in petty borough towns, where political feeling has been permitted to intermix with private interests, and agitate every link in the chain of social connexions,—we can understand how it has happened, in such instances, that institutions nominally consecrated to objects of public charity have been degraded to the worst purposes of jobbing, envy, and fraud. But when our observation takes a wider and a higher range, when we pass from the comparatively insignificant market towns to the densely populated and wealthy town of Manchester, words cannot express our humiliation on finding that the medical practice of the Infirmary of that place is shut against the observation of all those physicians and surgeons who are unconnected with that institution.

The injury to the public from the operation of such an odious system of misrule and illiberality is incalculable. In the first place, it enables the medical officers to proceed, from year to year, with a slovenly or mock discharge of their duty, without detection; and, secondly, it deprives resident physicians and surgeons of an opportunity of deriving information, the benign and salutary influence of which they might diffuse over an immense district. Thus an hospital which, it is declared by its managers and subscribers, is intended to lead to the mitigation of human suffering, is converted into a machine for propagating and perpetuating the most reprehensible feelings connected with the practice of the science of medicine.

If medical practitioners in our country towns any longer suffer under this plan of exclusion, the fault must rest with themselves; for the doors of Parliament are thrown open to them, and a Committee of the House of Commons has been instituted for the purpose of hearing and investigating all their professional complaints. Far be it from us to allege that medical practitioners, in remote places, have neglected to discharge their duty with those members of Parliament with whom they have associated in private. Seeing what has already been done, and knowing full well that a thorough knowledge of medical abuses has been acquired by many members of both Houses of the Legislature, we know, of course, that no allegation could be more unmerited or unfounded. But it must be borne in mind at this time, that the Committee is appointed to collect evidence; and that unless evidence be so collected, the report of the Committee must necessarily be defective, because it would necessarily be deduced from insufficient testimony. In all cases, therefore, of medical abuse, let information on the subject be communicated, without delay, to the chairman of the Committee, furnishing, of course, all the requisites of fact, date, and place. Even should the Committee refrain from calling the informant before them as a witness, it must not be presumed that the statements he may make are without their value; inasmuch as the intelligence so communicated may give rise to the proposal of highly important questions to competent witnesses.

In directing their attention, therefore, to medical abuses in general, we entreat

the physicians and surgeons of our principal towns, to bear in mind that odious abuse, in particular, which leads to their exclusion as visitors from the hospitals and infirmaries of the places in which they reside.

A DINNER, in support of the London University (or "North-London") Hospital, took place at the Freemasons Tavern, on Saturday the 15th inst.,—Lord EBRINGTON in the chair. There was a very large attendance of gentlemen on the occasion, and it was announced from the chair, in the course of the evening, that the large sum of four hundred and sixty pounds had been collected in the room in aid of the hospital funds, since increased to more than five hundred pounds.

We still hope that this institution will be known by its proper title, London-University Hospital, and that the nickname of "North-London Hospital" will be forthwith relinquished by the directors. Founded as this institution has been, avowedly for the purpose of affording a new aid to the cultivation of the science of medicine, we ardently hope that the medical practitioners of the metropolis will direct their powerful influence in a manner which will have the effect of contributing to its funds, and thus render it not only a noble receptable for students in physic, but also a temple of charity for the afflicted poor.

IN a leading article of *The Times* of Wednesday last, the Editor of that paper has given the following summary of his opinions in favour of a law for equalizing the rights of medical practitioners throughout the united kingdom,—thus adopting, to the fullest extent, the principles of medical government and education which have been for so many years recommended in the pages of THE LANCET:—

"Parliament, as the result of the important inquiry which is now in progress, must prescribe the course of medical studies, or provide boards of medical examinations, independent of partial claims of rival corporations, and destructive of their despotic monopolies. A high standard of qualification must be fixed, which shall be equally applicable to the three kingdoms, and a conformable degree or diploma obtained in one, must entitle the licentiate to practise in all. There need, then, be no distinction made in the course of prescribed studies between the education of men whose object is to practise any branch of the medical art. Being qualified for all branches, those who have made themselves more particularly masters of surgery will devote themselves to the surgical department of the profession, while those whose taste or superior knowledge of diseases leads them to prescribe for their patients without operating, will become physicians, and both, as at present is the case with the general practitioner, will be permitted to dispense their own medicines. The profession would thus have the same kind of practitioners and the same division of labour, as hitherto; but it would derive its rights from a different source,—its classification would be formed more according to the natural order of things;—the usurpation of what was formerly its lower branch over the higher would be destroyed,—and no distinction of country, college, or corporation, would interfere with the legitimate exercise of professional capacity."

A Letter, addressed to Henry Warburton, Esq., M. P., Chairman of the Committee of Enquiry, &c. &c. on the Grievances affecting the Medical Profession. By a Junior Practitioner. London: Churchill, 1834. pp. 47.

THIS short pamphlet contains a summary history of the medical corporations of the united kingdom of Great Britain and Ireland, and necessarily contains many particulars useful to Members of Parliament and others who are engaged in considering the question of medical reform. With regard to the origin of the corporations, two or three of the dates are incorrectly stated. The author also errs when he observes, that the decision of Lord Tenterden in the case of Handey v. Henson, has not been received with any confidence by the profession; and he is equally wrong in supposing, that the So-

ciety of Apothecaries cannot prosecute an unlicensed practitioner unless it can be proved that he has made a charge for medicine; but considering the use of the historical facts which the pamphlet contains, these are trifles.

UNIVERSITY OF EDINBURGH.

(*From our Edinburgh Correspondent.*)

It would be difficult to describe the sensation created in Edinburgh by the publication of the pamphlet entitled "An examination into the Causes of the declining Reputation of the Medical Faculty of the University of Edinburgh," and the interests of a large portion of the community of this metropolis being deeply at stake in all that concerns this once-renowned medical school, every day produces warmer and more warm conversations on the subject. Fresh points of discussion are constantly rising up, and scarcely an hour passes that the listening ear cannot catch some new tale of the jobbing, the corruption, and the political intrigues, of our medical professors!

The "Medical Faculty" have been constantly deliberating and consulting as to what had best be done in the present emergency, and they are more vexed and harassed by the short statement which lately appeared in THE LANCET, than by the publication of the original pamphlet itself. The medical professors have at last chosen *three* persons from among their number, to write a reply, or "refutation" of the pamphlet, and they have wisely enough fixed on Dr. THOMPSON, Mr. SYME, and Mr. TURNER, for the task, who are at the head of the list of corruptionists, and who, from being most likely to suffer by the *exposé*, it may be supposed are better qualified, and will be more earnest in drawing up the document, and making the best of a bad case. You will scarcely credit the fact that the Professors are already making great and unusual exertions to restore some character to the university and preserve their *own income*. Dr. ALISON now examines his class regularly every week, and Dr. CHRISTISON remains, at least, one hour at the hospital after his official visit, in order to answer the questions of the students regarding the cases.

Notwithstanding these and many other efforts, the number of "last year's" students is this session deficient by no less a number than *ninety-two!* Attendance on the natural-history class is now made imperative, the course being added to the curriculum, so that the number of classes on which attendance is now necessary to "qualify," as it is called, a student to take his "degree," is exactly double what it was twenty years ago; at the same time that the *fee* has been raised from three to four guineas!

The classes, however, which have already been added to the "curriculum," are by no means approved of by the whole of the professors. On the contrary, several are most decided in their opinion, that in times like the present, when the value of money has so much increased, and when other seminaries of education are so rapidly advancing in public estimation, it would have been wise had the medical faculty of the University of Edinburgh, in place of increasing the expenses, lessened it by a moiety.

The corruptionists, fully alive to their interests, have already dispatched an agent, a relative of one of the professors, to watch the proceedings of the *Parliamentary Committee*. Take you care to watch *him*.

INTERCEPTED LETTER.

[ADVICE TO A YOUNG LONDON PHYSICIAN.—LETTER 6.]

"MY VERY DEAR YOUNG FRIEND,—It was my sincere intention to have continued our most interesting correspondence, by writing to you a long letter last night, but I had scarcely quaffed a few glasses of remarkably fine old sherry, which I got from that enlightened nobleman the Duke of GLOUCESTER—and which his grace says is a perfect renovater to an old man—when I was summoned to Kensington Palace. I must confess, in justice to his Royal Highness, that I never partook of more potent juice of the grape than that sherry. No wonder that his dearly-beloved cousin, my

ever-lamented friend GEORGE the FOURTH, introduced 'old sherry' into the higher circles! On my return from the palace, I was so much fatigued by my exertions, that I was not able to hold a pen. But to-day I am not only *willing*, but *able*, to write to you, and, like the *young* Roman, again 'paratus sum.' You must not, however, accuse me of the 'cacoethes scribendi,' so common to those, and even the wisest of us, who are fast approaching the sunset of life,—and who are about to visit those realms from which no traveller returns. In truth, my dear young friend, the flattering encomiums which are daily bestowed on the important precepts which I have inculcated on the duties and conduct of a London physician, give me great encouragement, and invite me to proceed with them, and I have also the consolation to reflect that my writings on this, as well as on other deeply-interesting moral subjects, will be perused by all generations to eternity.

"I lately explained to you in full, and I hope satisfactorily, the nice art of 'bulletin' writing—a masterly accomplishment, which I have found of such great value to myself. I trust a knowledge of it will prove equally advantageous to you.

"Next let me draw your attention to the benefit you will derive from writing *a book*. I would advise you not to be long in making yourself known as an author. You may either write it yourself, or you may get it written for you, as it would be throwing away your time, and would take away your attention from so many classical and moral studies, all of which you might have to neglect for the mere preliminary object of learning to write the English language with correctness and elegance. You may write *Latin* with very little trouble. In fact, not one man in a thousand would detect even the grossest of your errors in that tongue. Besides, there are already a great number of men, connected with the troublesome press, for example, who can write and compose English a great deal too well, heaven knows. Even for myself, I may tell you privately, that I would not have ventured to write a speech for his Grace, the Duke, in *English*, though it gave me very little trouble to pen a Latin one for him. If you are *determined* to write English, you can acquire the habit of doing so, in a certain way, by scribbling in *our* medical periodical, where every *beginner* is invited to try his hand. In fact, Dr. RODERICK MACLEOD will be very grateful to you for any assistance, particularly for some *successful* cases, or, as he classically calls them, 'Cases of Recovery.' The communications containing unsuccessful cases might be much more useful to the profession, if the profession chanced to see them, but these are, for obvious reasons, never admitted into our Journal.

"You had better choose for your book some practical subject. Let it be a frequent disease that you may have the more consultations, but do not imitate the choice of Sir C. CLARKE and Mr. MAYO. I have never, myself, found it expedient to write any thing more than orations and bulletins. Their merit is thus justly summed up by my very dear friend, the reviewer of my book in the *Quarterly*, and which MURRAY has properly quoted in the advertisement of the new edition:—'The President of the Royal College of Physicians has produced, in these Essays, a delightful compound of professional knowledge and literary taste. Handled with skill and feeling such as his, subjects of medical research have not only nothing dry and repulsive about them, but are of deep and universal interest and attraction. His points of view and illustrations are, in general, those of a man of the world, as familiar with men and manners as with books; his language is that of a graceful scholar, and the reflections interspersed are not more remarkable for sagacity than agreeable for the benevolence and humane spirit which they reflect.'—My chief object in copying this passage into my letter, is to display to you the advantage which must result from your becoming personally acquainted with the writers in the reviews; and let me advise you to take care of this,—that when the book is printed you furnish your reviewing friend with the proof-sheets, so that a laudatory review may appear in the periodical, on the same week, or a little before, the book is published. This securedin a periodi-

cal of reputation, may prevent unfavourable criticisms in other journals. You have an example of this taking of books by the forelock, in the late reviews in the *Quarterly* of 'Bubbles from the Brunnens of Nassau,' and Monk Lewis's West India Journal. Do not, on any account, make direct or indirect overtures to that very inconvenient journal THE LANCET, the *Westminster Review*, the *Examiner*, or *Blackwood*, as the very uncivil editors of those journals would be sure to expose both yourself and friend.

"In collecting materials for your work, keep always on the look-out for some industrious, clever, moral, young man, to do the laborious part of the book, so that your attention may not be taken off from your literary and classical pursuits, which, after all, mark the gentleman, and are an essential ingredient of the accomplished physician. I have already observed, as I said on another occasion, 'the pure delight of such sources of innocent amusement as those which are opened in these fountains, and which are so well calculated to heighten the pleasure of future success and to soften the adversity of possible disappointment.'

"Several distinguished physicians have got a good number of patients by writing even very so-so books. It was I who advised Doctor SEYMOUR to get up his book on the diseases of the ovarium, which I do not now regret, though very few copies of it have been sold, and he must have lost a good deal of money by it, for it was expensively embellished, and printed on very large and fine paper. I was induced to make him write on that subject, in consequence of my being desirous that we should always be able to have a FELLOW whom we could consult on some of the uterine disorders of women, that we might have nothing to do with men-midwives, thus avoiding all connexion with the degrading and filthy practice of midwifery,—an employment proper only for the LICENTIATES of the College. My friend SEYMOUR had few materials to work with, but, what was nearly the same thing, and equally serviceable to him, he got Mr. BRUCE, a very intelligent and industrious youth, house-surgeon of the *Asylum of Health* (not a very correct concern by-the-by), of which the Doctor was then physician, to draw up cases, make dissections, &c. &c., and thus he made really a very decent-looking book, and afterwards got it favourably reviewed on very reasonable terms. Sir ASTLEY COOPER used to boast of manufacturing cases on purpose for his lectures, but he told me that when his lectures began to be published in THE LANCET, he entertained his pupils with 'no more fictions!' I must confess that I think that the worthy baronet's imagination carried him—for so moral a man—very great lengths.

"Before concluding this hasty epistle, let me urge you above all things to be cautious in the choice of an *assistant*, or of any one whom you may find it necessary to send to visit a patient, when you are not able to go yourself, either in consequence of bad health or absence from home. It is much below the dignity of *our* profession to follow the example of Sir ASTLEY in this matter. I have long known the fact that he used to employ his footman to assist him. He had plenty of nephews to provide for, whom it would have been much more respectable to have kept about him than an illiterate servant; and much more advantageous to the public, by-the-by, to have done so instead of forcing them into the hospitals. Moreover, the circumstance of the worthy baronet's co-operation with his footman's son has been brought before the public in the inconvenient journal in a remarkably vexatious manner at this particular time.

"As for myself, I make it a rule never to employ any one to attend my patients who is not a FELLOW. Doctor BAILLIE, when at any time he was out of London, adopted the most absurd plan of leaving a list of three Fellows stuck up in the lobby of his house, to whom patients were referred by his domestic, that they might choose their man. My plan is always to recommend a Fellow of *no* reputation—one of whom nobody has heard—one who is not likely to prove a successful rival to me when I return.—'My balmy consolation in assuaging the smart of affliction, and the sympathy which I manifest in moments of tenderness' (see my late ora-

tion), are so agreeable to patients, that it would be wrong in me to expose them to the chance of losing me as a physician, through the empty plausibility of some other person.

"Here I must conclude my admonitions for the present, as I have just received a saucy mandate from the Parliamentary Committee of Inquiry, requesting my attendance before them at twelve o'clock on Tuesday next. I wish that you would be there, as the circumstances I shall relate on that occasion will increase, in a tenfold degree, the reputation of our select and beautiful College. I hear there will be an attempt to brow-beat me. Should the report prove true, the members shall find, that whatever I *may* have been from *expediency*, I am not a courtier by *nature*. Expecting your presence on Tuesday, believe me ever faithfully yours,

"——— ———.

"March 11th, 1834."

MR. D. O. EDWARDS.—NOTE FROM BARON HEURTELOUP.

To the Editor of THE LANCET.

SIR,—I was very much hurt a short time back to find that a few persons still attached a degree of credit to insinuations thrown out against the motives of Mr. D. O. Edwards, in his advocacy of *lithotripsy*. I should have considered that the reply of Mr. T. T. Biggs, unequivocally refuting such imputations, was amply sufficient to erase any impressions which might have been made on the minds of those who are unacquainted with my friend Mr. Edwards. Since, however, my silence on the subject has been so unaccountably misinterpreted, I now break it by reiterating in the most positive and decided manner that no emoluments have ever been derived directly or indirectly by Mr. Edwards from his efforts in this branch of surgery; and I would further add, I have always so highly esteemed his character, that I should not venture to entertain the idea of making any such proposition to him.

Mr. Edwards, when I was a stranger to both the language and customs of this country, was by his writings one of the warmest advocates of the lithotriptic system, which, on its introduction into England, was to many unknown, or only received with incredulity; in his efforts he has been actuated by friendly and the most honourable feelings, and I should be grossly wanting to him as well as to myself, if I permitted an imputation so unmerited to rest upon him.

Such are the motives which induce me in this instance to deviate from a rule which I should always wish to follow:—That of confining myself in my writings to points of a purely scientific character.

I have the honour to be, Sir,
Your obedient servant,
HEURTELOUP, D.M.P.

18, Holles Street, Cavendish Square,
15th March, 1834.

CORRESPONDENTS.

Many communications have reached us relative to the jobbing now in progress at the Westminster Hospital. Instead of inserting those communications, we shall make known the facts to the Chairman and Members of the PARLIAMENTARY MEDICAL COMMITTEE, in order that the officers of the hospital and other individuals who are acquainted with every particular connected with the nefarious proceeding, may be examined before a competent tribunal. Was the vacancy in the office advertised? How many surgeons had the Westminster Hospital before Mr. GUTHRIE was elected? How often do the present surgeons attend?

Dr. *M'Carthy's* letter, which reached us only about ten days ago, was dated "Cork, November 30th."

We have received a pamphlet entitled "On Parish Medical Contracts, with Regulations for Parliamentary Enactment: also, on Self-Supporting Dispensaries and Union Infirmaries. By J. C. Yeatman, Esq., Surgeon to the Duke of Gloucester." It reached us too late, however, for notice this week, but we recommend it to general attention.

NOTICE.—It is particularly requested that ALL letters of business forwarded to the Office of THE LANCET,—whether they relate to the contents of the Journal, or refer to transactions connected with the Commission Department,—be INVARIABLY addressed to THE EDITOR—NOT WAKLEY. If this rule be not observed, it is impossible to guard against the impositions of anonymous scribblers who appear to have no other employment or pleasure than that of subjecting the conductors of journals to a heavy extortion in the shape of post-tax. If all letters of business transmitted to the office be addressed to the Editor, and NO letters, unless so addressed, be received except the postage be paid, impositions will be effectually prevented.

BOOKS RECEIVED.

The Anatomy and Surgery of Inguinal and Femoral Hernia. Illustrated by Plates coloured from Nature. By E. W. Tuson, F.L.S., Middlesex Hospital. Folio.

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